5-4320-275-13&P

This copy is a reprint which includes current pages from Changes 1 through 3.

TM 5-4320-275-13 & P

INTRODUCTION 1-1

OPERATING INSTRUCTIONS 2-1

OPERATOR/CREW MAINTENANCE INSTRUCTIONS 3-1

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS 4-1

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS 5-1

REFERENCES A-1

MAINTENANCE ALLOCATION CHART B-1

REPAIR PARTS AND SPECIAL TOOLS LIST C-1

EXPENDABLE SUPPLIES AND MATERIALS LIST D-1

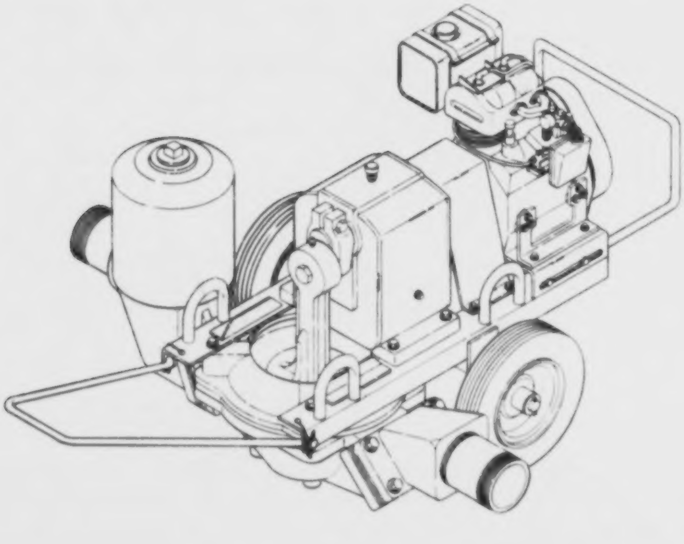
GLOSSARY

ALPHABETICAL INDEX

TECHNICAL MANUAL

OPERATOR'S, ORGANIZATIONAL, AND DIRECT SUPPORT MAINTENANCE MANUAL, INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST FOR

PUMP, RECIPROCATING, POWER-DRIVEN, DIAPHRAGM, GASOLINE-ENGINE-DRIVEN, WHEEL-MOUNTED
PEABODY BARNES MODEL US40CDG
4320-01-092-2210



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1 MARCH 1983

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TM 5-4320-275-13&P
C 3

CHANGE }
No. 3 }

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 4 April 1988

Operator's, Organizational, and Direct Support Maintenance Manual Including Repair Parts and Special Tools List For

PUMP, RECIPROCATING, POWER-DRIVEN, DIAPHRAGM, GASOLINE-ENGINE-DRIVEN, WHEEL-MOUNTED
PEABODY BARNES MODEL
US40CDG
4320-01-092-2210

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Remove pages	Insert pages
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
4-83 and 4-84	4-83 and 4-84
A-1/A-2	A-1/A-2
B-1 through B-6	B-1 through B-6

2. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

R. L. DILWORTH
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION:
To be distributed in accordance with DA Form 12-25A, Operator's, Unit, and Direct Support and General Support Maintenance requirements for Pump, Reciprocating, Diaphragm, Gas Driven, Power Driven, Wheel Mounted (US40CDG) (TM 5-4320-275-13&P)

CHANGE
NO 2

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Operator's Organizational, and Direct Support Maintenance Manual, Including Repair Parts and Special Tools List For

PUMP, RECIPROCATING, POWER-DRIVEN, DIAPHRAGM, GASOLINE-ENGINE-DRIVEN, WHEEL-MOUNTED
PEABODY BARNES MODEL
US40CDG
4320-01-092-2210

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Remove pages	Insert pages
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C-25 and C-26	C-25 and C-26

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CHANGE }
No. 1 }

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DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 2 September 1986

Operator's, Organizational, and Direct Support Maintenance Manual, Including Repair Parts and Special Tools List For

PUMP, RECIPROCATING, POWER-DRIVEN, DIAPHRAGM, GASOLINE-ENGINE-DRIVEN, WHEEL-MOUNTED
PEABODY BARNES MODEL
US40CDG
4320-01-092-2210

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Remove pages	Insert pages
C-7 and C-8	C-7 and C-8
C-13 through C-16	C-13 through C-16
C-21 through C-26	C-21 through C-26

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DISTRIBUTION:
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WARNING

CARBON MONOXIDE

is produced by the internal combustion engine of this pump.

DEATH

may result if personnel fail to observe safety precautions.

Carbon monoxide is a colorless, odorless, deadly poisonous gas which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air contaminated with carbon monoxide produces symptoms of headache, dizziness, loss of muscle control, or apparent drowsiness. Coma, permanent brain damage, or death can result from severe exposure.

Carbon monoxide occurs in the exhaust fumes of internal combustion engines and becomes dangerously concentrated under conditions of inadequate ventilation. Observe the following safety precautions whenever the engine is running:

- Perform tests outdoors or in a well-ventilated area.
- Do not idle the engine for long periods without maintaining adequate ventilation.
- Be alert at all times for exhaust odors and exposure symptoms.
- Be aware: the field protective mask for chemical-biological-radiological (CBR) protection will not protect you from carbon monoxide poisoning.

Expose victims to fresh air, keep warm, and do not permit physical exercise. For artificial respiration, refer to FM21-11.

SEVERE BURNS

illness, death, or injury may result if personnel fail to handle gasoline properly. Observe the following safety precautions:

- Do not inhale vapor.
- Do not refuel a hot or running engine.
- Do not refuel near open flame, sparks, or excessive heat.
- Be certain fuel lines and connections are secure.
- Do not overfill the fuel tank.
- Work in a well-ventilated area.

Allow an engine and pump to cool before performing any service or maintenance.

WARNING

PERSONAL INJURY

may result if the engine cutoff switch is not turned off for service or maintenance.

ELECTRICAL SHOCK

may result from performing maintenance while the engine is running. The ignition system of this engine contains dangerous voltages which can cause severe electrical shock.

HEALTH AND SAFETY HAZARD

exists when cleaning solvents are used. Clean all parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning sovlent (fed. spec. P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° to 138°F (38° to 59°C).

EYE INJURY

may result when parts are cleaned with compressed air. Use approved safety glasses, goggles, or face shield to prevent eye injury.

EXPLOSION HAZARD

exists when welding repairs are attempted on fuel tank.

TECHNICAL MANUAL

TM 5-4320-275-13&P

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 1 MARCH 1983

OPERATOR'S, ORGANIZATIONAL, AND DIRECT SUPPORT MAINTENANCE MANUAL, INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST

PUMP, RECIPROCATING, POWER-DRIVEN, DIAPHRAGM, GASOLINE-ENGINE-DRIVEN, WHEEL-MOUNTED

PEABODY BARNES MODEL US40CDG

4320-01-092-2210

Current as of 1 October 1982

Reporting Errors and Recommending Improvements

You can help improve this manual. If you find any mistake or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR-MCTS, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

		Page	Illus Figure
CHAPTER 1.	INTRODUCTION	1-1	
Section I.	General Information	1-1	
Section II.	Equipment Description and Data	1-2	
Section III.	Principles of Operation	1-5	
CHAPTER 2.	OPERATING INSTRUCTIONS	2-1	
Section I.	Description and Use of Operator's Controls and Indicators	2-1	
Section II.	Operator/Crew Preventive Maintenance Checks and Services	2-2	
Section III.	Operation Under Usual Conditions	2-5	
Section IV.	Operation Under Unusual Conditions	2-10	
CHAPTER 3.	OPERATOR/CREW MAINTENANCE INSTRUCTIONS	3-1	
Section I.	Lubrication Instructions	3-1	
Section II.	Troubleshooting Procedures	3-1	
Section III.	Maintenance Procedures	3-4	
CHAPTER 4.	ORGANIZATIONAL MAINTENANCE INSTRUCTIONS	4-1	
	Chapter Overview	4-1	
Section I.	Repair Parts, Special Tools, TMDE, and Support Equipment	4-1	
Section II.	Service Upon Receipt	4-2	4-1
Section III.	Operational Checks	4-5	
Section IV.	Preventive Maintenance Checks and Services	4-7	
Section V.	Troubleshooting	4-14	
Section VI.	Maintenance Procedures	4-23	
Section VII.	Preparation for Storage or Shipment	4-84	

		Page	Illus Figure
CHAPTER 5.	DIRECT SUPPORT MAINTENANCE INSTRUCTIONS	5-1	
	Chapter Overview	5-1	
Section I.	Repair Parts, Special Tools, TMDE, and Support Equipment	5-1	
Section II.	Troubleshooting	5-2	
Section III.	Maintenance Procedures	5-3	
APPENDIX A.	REFERENCES	A—1	
APPENDIX B.	MAINTENANCE ALLOCATION CHART	B—1	
Section I.	Introduction	B—1	
Section II.	Maintenance Allocation Chart	B—4	
Section III.	Tool and Test Equipment Requirements	B—5	
Section IV.	Remarks	B—5	
APPENDIX C.	ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST	C—1	
Section I.	Introduction	C—1	
Section II.	Repair Parts List	C—7	
Group 01	Engine		
	Engine Assembly	C—7	1
Group 02	Fuel System		
	Tank, Line, Fittings and Filter	C—9	2
Group 03	Frame		
	Frame Assembly and Wheels	C—11	3
Group 04	Accessory Items		
	Data Plates	C—13	4
	Suction Hose	C—15	5
Group 05	Pump		
	Accumulator, Check Valve Assemblies and Discharge Port	C—17	6
	Diaphragm	C—19	7
	Connecting Rod Assembly	C—21	8
	Gear Reducer	C—23	9
Section III.	Special Tools List (Not Applicable)		
Section IV.	National Stock Number and Part Number Index	C—25	
APPENDIX D.	EXPENDABLE SUPPLIES AND MATERIALS LIST	D—1	
GLOSSARY		Glossary 1	
ALPHABETICAL INDEX		Index 1	

HOW TO USE THIS MANUAL

This manual consists of:

1. Introduction to Model US40CDG Diaphragm Pump.
2. Principles of operation describing the functions of the diaphragm pump.
3. Maintenance instructions for operator, organizational, and direct support maintenance. These chapters contain:
    a. Information on repair parts, special tools, test, measurement and diagnostic equipment (TMDE), and support equipment
    b. Instructions for service upon receipt of the diaphragm pump
    c. Operational checks
    d. Preventive maintenance checks and services (PMCS)
    e. Troubleshooting
    f. Maintenance procedures
4. Appendixes in the back of the manual list:
    a. References
    b. Maintenance Allocation Chart
    c. Repair parts and special tools
    d. Expendable supplies and materials

You will need to perform operational checks and PMCS on a regular basis. The information in these sections is in tabular form so you can use it more easily.

The troubleshooting data is coded by malfunction number. The symptom index on page 4-14 or 5-2 is your guide to these malfunctions. Read through the applicable symptom index if the diaphragm pump is not working right.

Instructions for

Inspecting the diaphragm pump

Testing the diaphragm pump

Adjusting the diaphragm pump

Replacing authorized assemblies

are presented in tabular form to make them easier to use. Each repair paragraph describes one specific task. As much as possible, complete instructions are included. There are some paragraphs which make you look in other places in the manual, but this has been avoided whenever possible. For procedures that apply to the engine refer to TM 5-2805-257-14. The engine Repair Parts and Special Tool List is TM 5-2805-257-24P.

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

Type of Manual: Operator's, Organizational, and Direct Support Maintenance

Model Number and Equipment Name: US40CDG Diaphragm Pump

Purpose of Equipment: Pumps water containing solids

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System.

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Refer to TM 750-244-3 for instructions.

1-4. PREPARATION FOR STORAGE AND SHIPMENT

Instructions for preparation for storage and shipment are in Chapter 4.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

EIR's can and must be submitted by anyone who is aware of an unsatisfactory condition with the equipment design or use. It is not necessary to show a new design or list a better way to perform a procedure; simply tell why the design is unfavorable or why a procedure is difficult. EIR's may be submitted on SF 368 (Quality Deficiency Report). Mail directly to Commander, U.S. Army Troop Support Command, ATTN: AMSTR-QX, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-6. PURPOSE OF DIAPHRAGM PUMP

Pumps water containing solids

1-7. CHARACTERISTICS

- Constant speed operation
- Wheel mounted for mobility
- Self-priming

1-8. CAPABILITIES AND FEATURES

- Replaceable flapper valves
- Easy to remove obstructions from valve areas
- Speed-reduction system for fixed control of operating rate
- Engine cutoff switch for positive control
- Permanently affixed tiedown provisions

1-9. LOCATION AND DESCRIPTION OF EXTERNAL COMPONENTS

Ⓐ ENGINE. Power source.

Ⓑ COUPLING GUARD. Metal safety cover.

Ⓒ GEAR REDUCER. Speed reduction unit.

Ⓓ CRANK. Attaches to gear reducer and connecting rod.

Ⓔ CONNECTING ROD. Attaches to pump.

Ⓕ ACCUMULATOR. Reservoir.

Ⓖ INLET FITTING.

Ⓗ DRAW BAR.

Ⓘ OUTLET FITTING.

Ⓙ WHEEL.

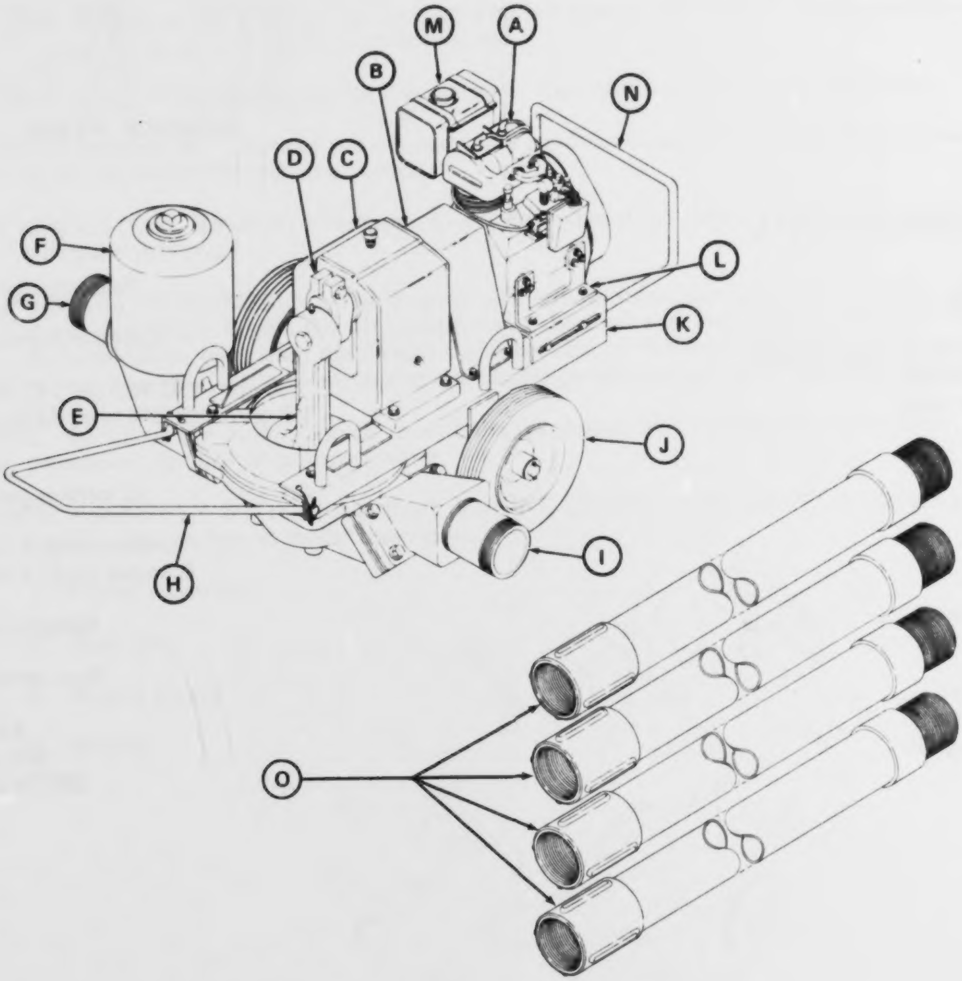
Ⓚ FRAME.

Ⓛ ENGINE MOUNT. Mounts engine to frame.

Ⓜ FUEL TANK. Mounts to engine.

Ⓝ ENGINE GUARD. Metal bumper for engine protection.

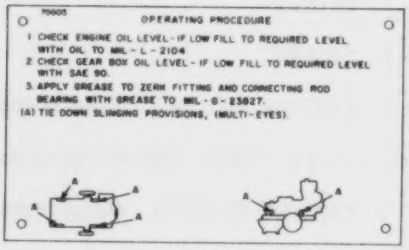
Ⓞ SUCTION HOSE.



1-10. IDENTIFICATION

The diaphragm pump has two identification plates, as follows:

a. *Operating procedure plate.* The operating procedure plate is located on the coupling guard. It provides lubrication points with type of lubricant and illustrates tiedown slinging provisions.



OPERATING PROCEDURE

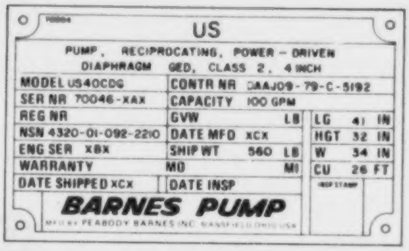
1 CHECK ENGINE OIL LEVEL - IF LOW FILL TO REQUIRED LEVEL WITH OIL TO MIL - L - 2104

2 CHECK GEAR BOX OIL LEVEL - IF LOW FILL TO REQUIRED LEVEL WITH SAE 90.

3 APPLY GREASE TO ZERK FITTING AND CONNECTING ROD BEARING WITH GREASE TO MIL - G - 23827.

(A) TIE DOWN SLINGING PROVISIONS, (MULTI - EYES)

b. *Identification plate.* The identification plate is located on the coupling guard. It provides the pump nomenclature, national stock number, pump and engine serial numbers, contract number, weight, and dimension.



US

PUMP, RECIPROCATING, POWER - DRIVEN
DIAPHRAGM GED, CLASS 2, 4 INCH

MODEL US40CDG	CONTR NR DAAJ09-79-C-5192	
SER NR 70046-XAX	CAPACITY 100 GPM	
REG NR	GVW LB	LG 41 IN
NSN 4320-01-092-2210	DATE MFD XCX	HGT 32 IN
ENG SER XBX	SHIP WT 560 LB	W 34 IN
WARRANTY	MO MI	CU 26 FT
DATE SHIPPED XCX	DATE INSP	INSP STAMP

BARNES PUMP
MFD BY PEABODY BARNES INC. MANSFIELD OHIO USA

1-11. EQUIPMENT DATA

Manufacturer	Peabody Barnes, Inc.
Model number	US40CDG
Type	Self-priming diaphragm
Output (Maximum rated speed)	
At 10 feet head	100 gpm [38,400 phr] (378.5 L/m)
At 20 feet head	66 gpm [25,344 phr] (249.81 L/m)
Rated speed	
Engine	3600 rpm
Pump	60 strokes per minute
Port size	
Suction	6 inches long, 4-inch NPT
Discharge	6 inches long, 4-inch NPT
Engine	
Manufacturer	Military standard
Model number	2A016
Type	Four stroke cycle
Horsepower	3
Cooling type	Air cooled
Lubricating oil	MIL-L-2104
Weight (Dry)	560 lb (254 kg)

Section III. PRINCIPLES OF OPERATION

1-12. DIAPHRAGM PUMP

Consists of a gasoline engine and a wheel-mounted diaphragm pump. Power from the engine is transferred to the pump through a floating coupling, gear reducer, crank, and connecting rod.

Ⓐ ENGINE. Secured by engine mount to base assembly.

Ⓑ COUPLING GUARD. Serves as a safety device if coupling should shear.

Ⓒ FLOATING COUPLING. Connects engine drive shaft to gear reducer input shaft.

Ⓓ GEAR REDUCER. Serves as a speed reducer to transfer engine power to the pump.

Ⓔ CRANK. Fitted to the gear reducer output shaft to change the circular motion of the shaft to lift-and-force motion of the connecting rod.

Ⓕ CONNECTING ROD. Serves as the link between the crank and the pump diaphragm.

Ⓖ PUMP DIAPHRAGM. Changes the lift-and-force motion to suction and discharge pressure to move the water through the pump.

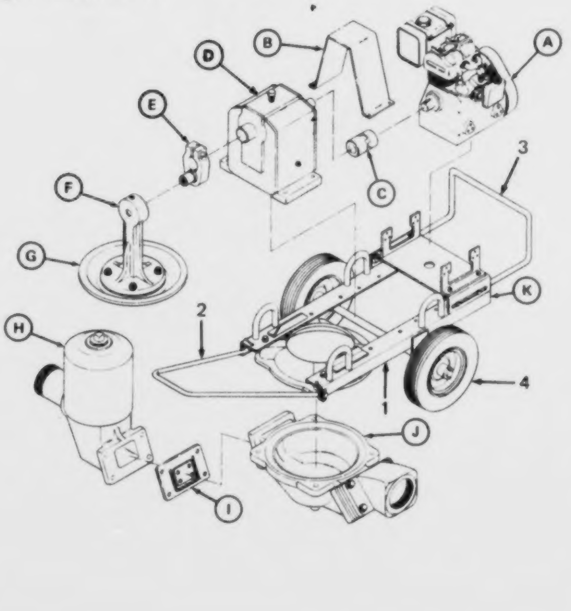
Ⓗ ACCUMULATOR. Serves as a reservoir to provide a constant flow of inlet water and to eliminate priming.

Ⓘ BYPASS VALVE ASSEMBLY. The suction side bypass valve assembly starts to open when the pump diaphragm begins the lift position and the discharge side bypass valve assembly starts to close. When the pump diaphragm starts moving to the force position, the suction side bypass assembly starts to close and the discharge side bypass valve assembly starts to open.

Ⓙ BOWL. Serves as the pump base to mount the diaphragm and bypass valve assemblies. Provides directional control of pumped water.

Ⓚ FRAME ASSEMBLY WITH DRAW BAR, ENGINE GUARD, AND WHEELS. Serves as a mobile support for all major assemblies.

1. Frame Assembly
2. Draw Bar
3. Engine Guard
4. Wheels



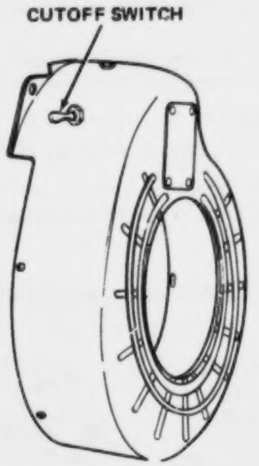
CHAPTER 2
OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

WARNING

Personal injury may result if the engine cutoff switch is not turned off during service or maintenance.

The engine CUTOFF SWITCH attaches to the top of the engine and has two positions, OFF and ON. The switch controls the electrical current to the spark plug. In the ON position the electrical current will travel to the spark plug to run the engine. In the OFF position the electrical current will not travel to the spark plug and the engine will not start.



Section II. OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-1. GENERAL

a. *Before you operate.* Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

b. *While you operate.* Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

c. *After you operate.* Be sure to perform your after (A) PMCS.

d. *If your equipment fails to operate.* Troubleshoot with proper equipment. Report any deficiencies using the proper forms; see TM 38-750.

2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Table 2-1 lists the preventive maintenance checks and services which shall be performed at specified intervals by the operator/crew.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services

B—Before Operation D—During Operation A—After Operation

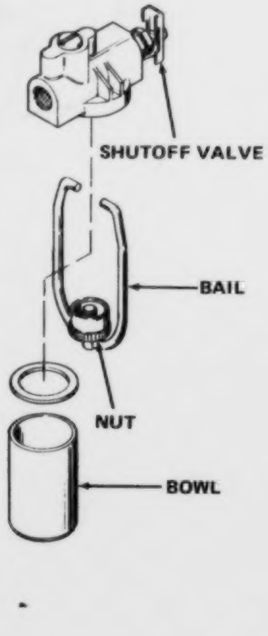
Item No.	Interval			ITEM TO BE INSPECTED PROCEDURE	Equipment Is not Ready/Available If:
	B	D	A		
1	•			*Engine Oil Level.* Check engine oil in accordance with LO 5-4320-275-02.	
2			•	*Gear Reducer Oil Level.* Check oil in accordance with LO 5-4320-275-02.	
3			•	*Fuel Filter.* Check for dirt or water in fuel filter. Turn shutoff valve in to OFF. Loosen nut on bail of fuel filter. Swing bail aside and remove fuel bowl. Dump fuel from bowl and wipe clean. Reposition fuel bowl and bail. Tighten nut on bail. Turn shutoff valve out to ON.  	

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services – Continued

B–Before Operation D–During Operation A–After Operation

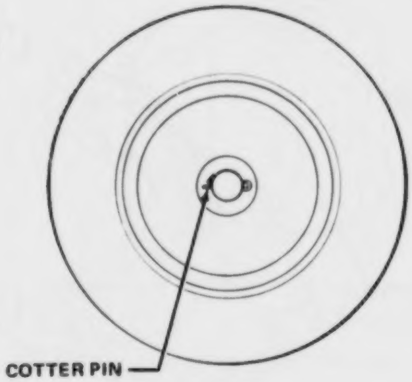
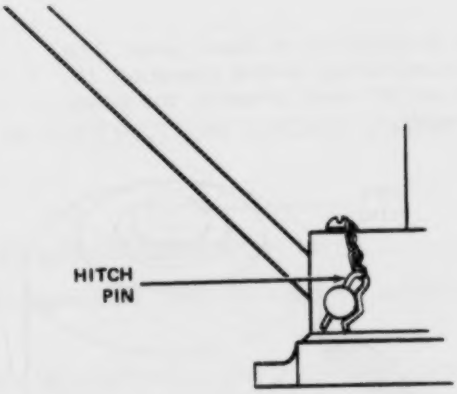
Item No.	Interval			ITEM TO BE INSPECTED PROCEDURE	Equipment Is not Ready/Available If:
	B	D	A		
4	•			*Wheels.* Check that cotter pin is securely holding wheel on axle. Replace if missing. Put cotter pin through hole in axle. Bend one end of cotter pin along contour of axle.  	
5	•			*Draw Bar.* Check that hitch pins are in position through ends of draw bar.  	
6			•	*Fuel System.* Check for loose lines and fittings. Tighten if necessary.	Fuel lines cannot be tightened to stop leaks.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services – Continued

B–Before Operation D–During Operation A–After Operation

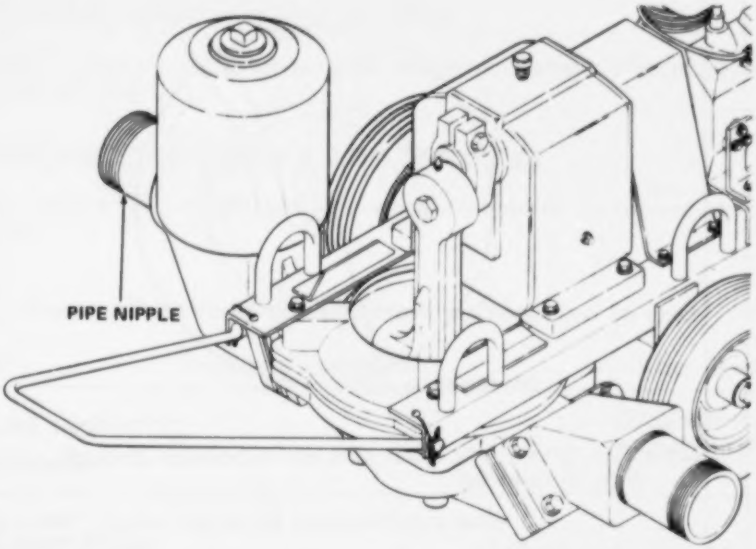
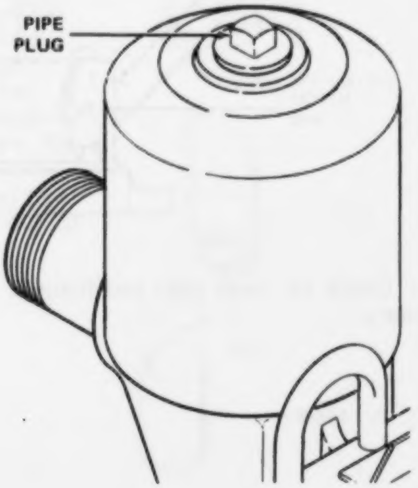
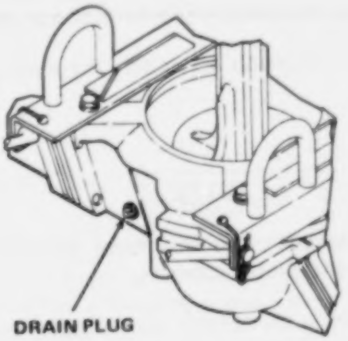
Item No.	Interval			ITEM TO BE INSPECTED PROCEDURE	Equipment Is not Ready/Available If:
	B	D	A		
7	•			*Pump Assembly.* Check inlet and outlet pipe nipples for obstructions. Remove any dirt or debris clogging the pipe nipples.  	Water will not pass through pump for normal operation.
8		•		*Check Valves.* Listen to operation of check valves. They must open and close during normal operation. If the check valves do not work properly, the pump will not pump water.	Check valves do not open and/or close.
9	•			*Accumulator.* Check that pipe plug is on accumulator. Tighten pipe plug if it is loose.  	Pipe plug is missing.

Table 2-1. Operator/Crew Preventive Maintenance Checks and Services – Continued

B–Before Operation D–During Operation A–After Operation

Item No.	Interval			ITEM TO BE INSPECTED PROCEDURE	Equipment Is not Ready/Available If:
	B	D	A		
10	•			*Pump Bowl.* Check that drain plug is on pump bowl. Tighten drain plug if it is loose. 	Drain plug is missing.
11	•	•	•	*Suction Hose.* Check for cracks or other damage. Tighten connections if loose.	Suction hose leaks.

Section III. OPERATION UNDER USUAL CONDITIONS

2-3. ASSEMBLY AND PREPARATION FOR USE

a. This pump comes fully assembled, ready for use after attaching appropriate suction and discharge hoses.

b. Instructions for use are for information and guidance of personnel responsible for operation of the pump assembly.

c. The operator must know how to perform every operation of which the pump assembly is capable. The following paragraphs contain instructions on starting and stopping the pump assembly, on operation of the pump assembly, and on coordinating the basic motions to perform the specific tasks for which the equipment is designed. Since nearly every job presents a different problem, the operator may have to vary given procedures to fit the individual job.

2-4. INITIAL ADJUSTMENTS

Inspect pump assembly and engine for loose or missing hardware, corrosion, or obvious damage. Report any problems to organizational maintenance.

2-5. OPERATING PROCEDURE

a. *Selection and Preparation of Pump Site.*

(1) Locate the pump on a level surface as close to the liquid supply as possible.

(2) Block the wheels of the pump assembly to prevent the pump from shifting during operation.

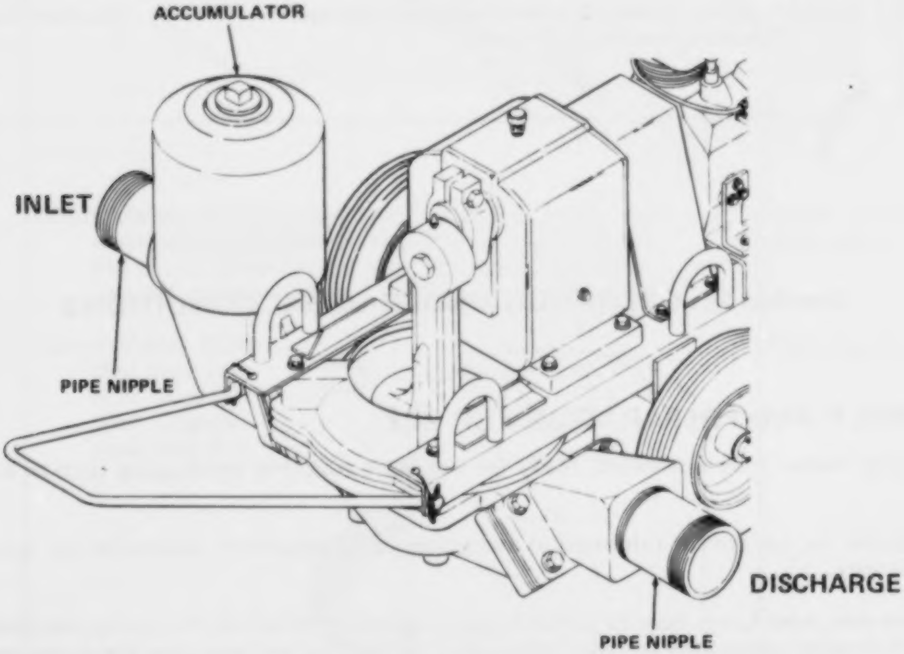
(3) When connecting suction hose to pump assembly, the suction lift of the pump must not exceed 25 feet (7.62 m).

b. *Hose Installation.*

NOTE

Use the shortest possible length of suction hose. Suction hose exceeding 20 feet (6.09 m) will reduce the pump capacity.

(1) Connect the suction hose to the accumulator pipe nipple. Use thread sealant on threaded connections. Tighten the suction hose with a spanner wrench NSN 5120-00-277-9077.



(2) If more than one length of hose is required, add additional lengths to end of first hose attached to pump.

CAUTION

Strainer NSN 4730-00-203-6309 must be used on the end of the suction hose to prevent rocks and other unbreakable material from entering the pump. These could cause severe damage to the pump.

(3) Connect a hose to the discharge pipe nipple of the pump. The length of the discharge hose shall not exceed 50 feet (15.24 m).

(4) Make sure the end of the suction hose and strainer are completely submerged in the liquid to be pumped. Make sure the end of the discharge hose is free from any restrictions.

2-6. STARTING

WARNING

Severe burns, illness, or death may result if personnel fail to handle gasoline properly. Observe the following precautions:

- **Do not inhale vapor.**
- **Do not refuel a hot or running engine.**
- **Do not refuel near open flame, sparks, or excessive heat.**
- **Be certain fuel lines and connections are secure.**
- **Do not overfill fuel tank.**
- **Work in a well-ventilated area.**

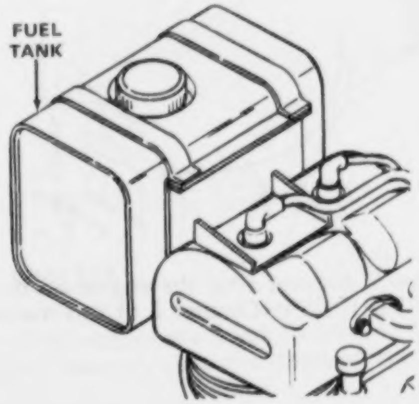
a. Perform checks shown on operating procedure plate.

(1) Check engine oil level.

(2) Check gear box (gear reducer) oil.

(3) Has connecting rod been lubricated?

b. Fill fuel tank.

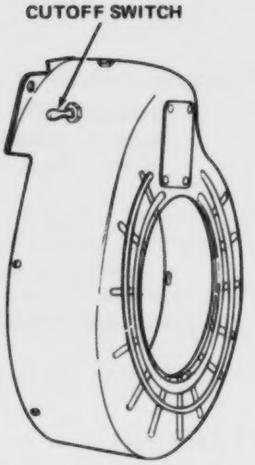


c. Prime fuel system if engine is new or seldom-used.
    (1) Turn engine cutoff switch to OFF position.
    (2) Pull starting rope.
    (3) Allow starting rope to retract.
    (4) Pull starting rope again.
    (5) Allow to retract.

d. Turn engine cutoff switch ON.

e. Pull starting rope sharply.

f. Allow to retract.



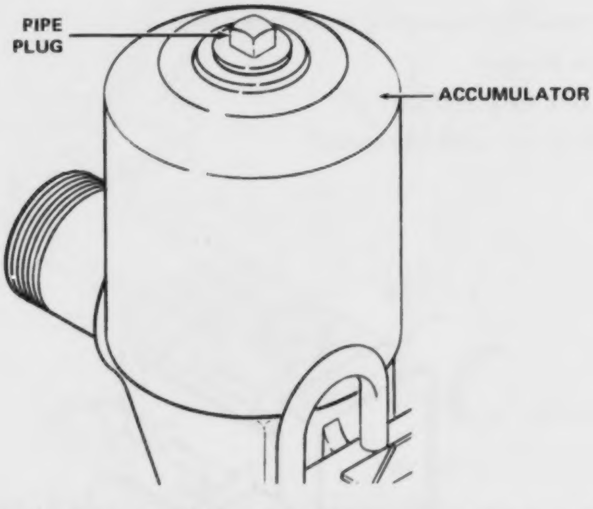
g. Repeat steps e. and f., if necessary, until engine starts. (Cold engines are harder to start.)

h. If engine does not start after several attempts, see TROUBLESHOOTING PROCEDURES in Chapter 3 of this manual.

2-7. OPERATION

NOTE

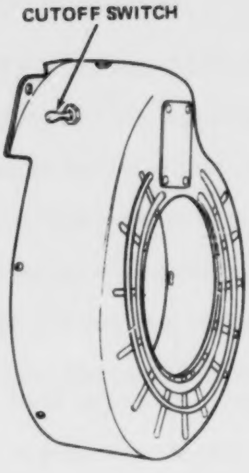
If the suction lift is less than 15 feet (4.57 m), pump priming is normally not necessary. If the suction lift is greater than 15 feet (4.57 m), use a 15/16 inch wrench to remove pipe plug from accumulator and pour 2 gallons (7.6 liters) of water into the accumulator to prime the pump. Install the pipe plug with a 15/16 inch wrench.



The pump should prime within 2 minutes after the engine starts. If the pump does not prime, see TROUBLESHOOTING PROCEDURES in Chapter 3 of this manual.

2-8. STOPPING

To stop pump, turn engine cutoff switch to OFF position.



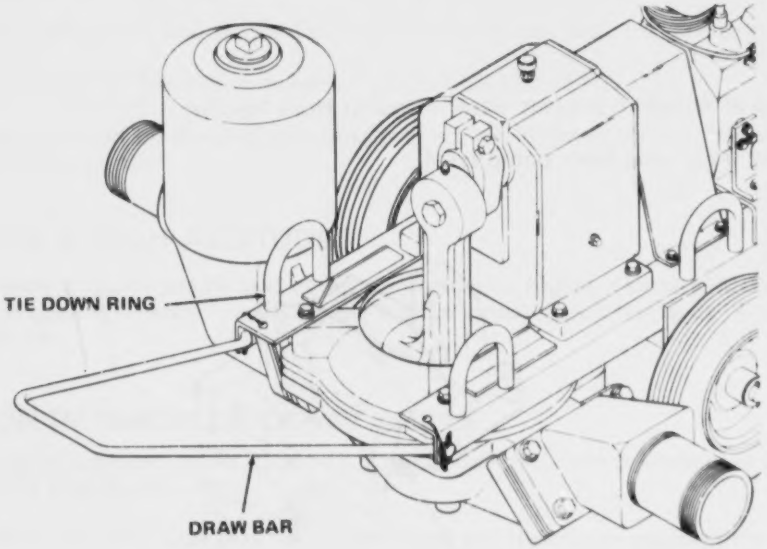
2-9. MOVEMENT TO A NEW WORKSITE

CAUTION

The wheels and axle of the pump assembly are designed to move the pump assembly into position at the worksite. They are not designed for use during road or highway movement of the pump assembly.

a. Use a shipping dock or use wood planks as a ramp to load the pump assembly on the bed of a suitable truck to transport the pump assembly.

b. Grasp the draw bar when moving the pump assembly.



c. Secure the pump assembly to the side of the truck to prevent it from shifting. Use the four tie down rings to secure the pump assembly. Lay the hoses on the bed of the truck.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-10. OPERATION IN EXTREME COLD

a. Keep entire unit free of ice and snow.

b. Cover unit when not in use.

c. Shelter unit from weather, if possible.

d. Use proper engine oil for cold weather. See LO 5-4320-275-12.

e. Keep fuel tank full to prevent moisture condensation, which can freeze.

f. Check and clean fuel filter before and after operating to prevent an accumulation of moisture, which can freeze.

(1) Turn shutoff valve in to OFF.

(2) Loosen nut on bail of fuel filter.

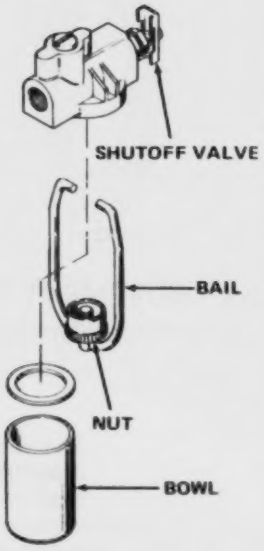
(3) Swing bail aside and remove fuel bowl.

(4) Dump fuel from bowl and wipe bowl.

(5) Reposition fuel bowl and bail.

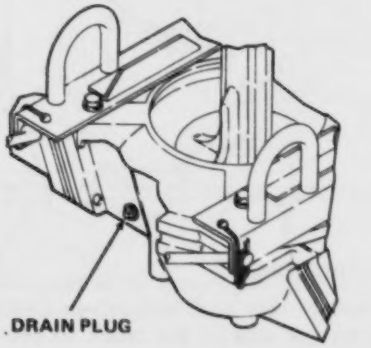
(6) Tighten nut on bail.

(7) Turn shutoff valve out to ON.

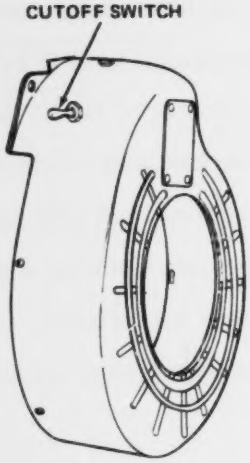


g. Drain pump after use to prevent water in pump from freezing.

(1) Remove drain plug from pump bowl.



(2) Turn engine cutoff switch to OFF position.



(3) Pull starting rope sharply.

(4) Allow to retract.

(5) Repeat steps (3) and (4) above until all water is drained from pump bowl and accumulator.

(6) Replace and tighten drain plug.

2-11. OPERATION IN EXTREME HEAT

a. If possible, protect the pump assembly from direct rays of the sun.

b. Allow adequate space for ventilation. If the pump is operated in an enclosure, use a fan to circulate air.

c. Keep the engine shrouding and pump clean to provide proper heat transfer to the air.

d. Check that lubricants in the engine comply with LO 5-4320-275-12.

e. Although fluid flow can be stopped for short periods, avoid doing so in extreme heat for the fluid may boil in the pump bowl.

2-12. OPERATION IN HIGH ALTITUDES

The operating efficiency of both engine and pump diminishes at higher altitudes. Make sure that the engine is operating at peak efficiency, providing the highest possible pump output. Adjust in accordance with TM 5-2805-257-14.

2-13. OPERATION IN SANDY OR DUSTY AREAS

a. When the pump is operated under sandy or dusty conditions, service engine air cleaner frequently in accordance with TM 5-2805-257-14.

b. While filling the fuel tank, take care to prevent sand and dust from entering the fuel system.

c. Check fuel filter bowl for accumulations of dirt.

(1) Turn shutoff valve in to OFF.

(2) Loosen nut on bail of fuel filter.

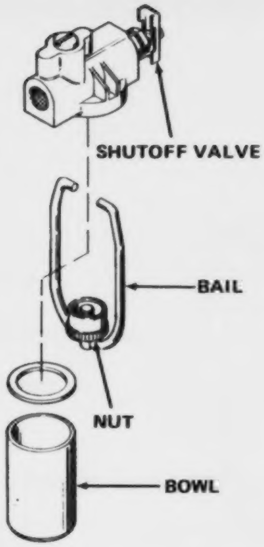
(3) Swing bail aside and remove fuel bowl.

(4) Dump fuel from bowl and wipe bowl.

(5) Reposition fuel bowl and bail.

(6) Tighten nut on bail.

(7) Turn shutoff valve out to ON.



2-14. OPERATION UNDER RAINY OR HUMID CONDITIONS

a. Fill the fuel tank immediately after every operating period to prevent moisture in the air from condensing and entering the fuel system. Check the fuel filter bowl frequently for collection of moisture.

b. Take special care to prevent rust and corrosion of exposed metal surfaces.

2-15. OPERATION IN SALT WATER AREAS

a. Salt water causes corrosion. Use fresh water to wash off any salt water that comes in contact with the equipment. This will help prevent the formation of rust and corrosion.

b. Take special care to prevent rust and corrosion of exposed metal surfaces.

CHAPTER 3

OPERATOR/CREW MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

No lubrication is authorized for operator/crew maintenance.

Section II. TROUBLESHOOTING PROCEDURES

3-1. TROUBLESHOOTING

a. Table 3-1 lists the common malfunctions which you may find during the operation or maintenance of the diaphragm pump or its components. Perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Table 3-1. Operator/Crew Troubleshooting

MALFUNCTION
    TEST OR INSPECTION
        CORRECTIVE ACTION

1. ENGINE FAILS TO START

Step 1. Check for empty fuel tank.

Fill fuel tank.

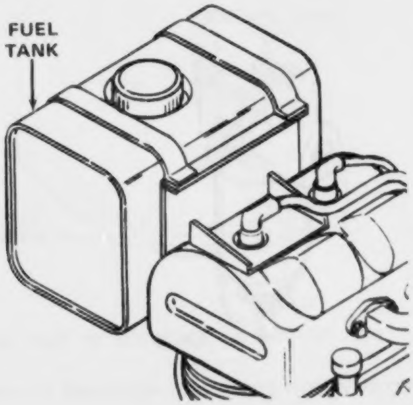


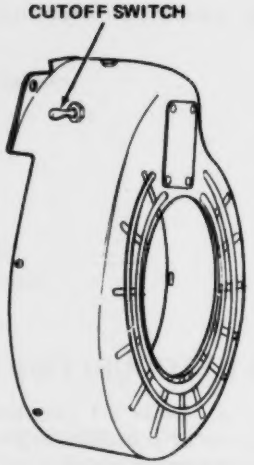
Table 3-1. Operator/Crew Troubleshooting – Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Check for water in fuel.

If water is present notify organizational maintenance.

Step 3. Turn engine cutoff switch to OFF position. Pull starting rope to prime fuel system. Turn cutoff switch to ON position and try to start engine.



Step 4. Check for moisture on spark plug or plug wire.

Dry plug and wire, and try to start engine. Notify organizational maintenance of engine still does not start.

2. ENGINE STARTS BUT RUNS POORLY

Step 1. Check for water in fuel tank.

If water is present notify organizational maintenance.

Step 2. Check for clogged fuel filter.

If clogged notify organizational maintenance.

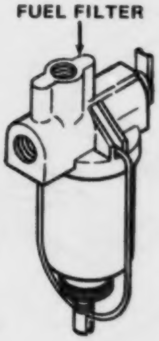


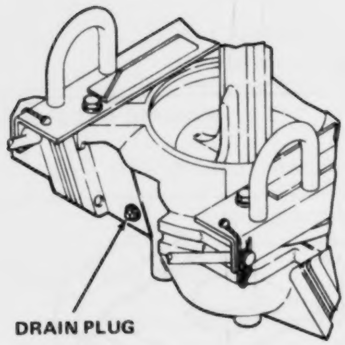
Table 3-1. Operator/Crew Troubleshooting — Continued

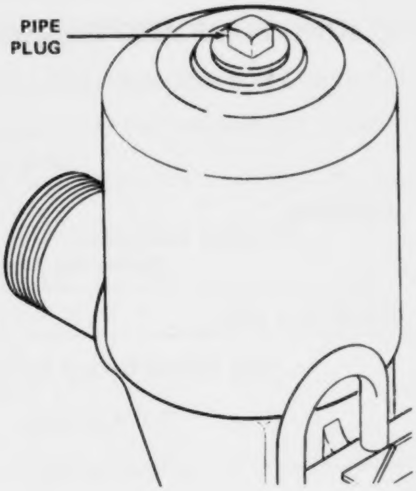
MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. PUMP FAILS TO PRIME

Step 1. Check for loose drain plug on pump bowl or pipe plug on accumulator.

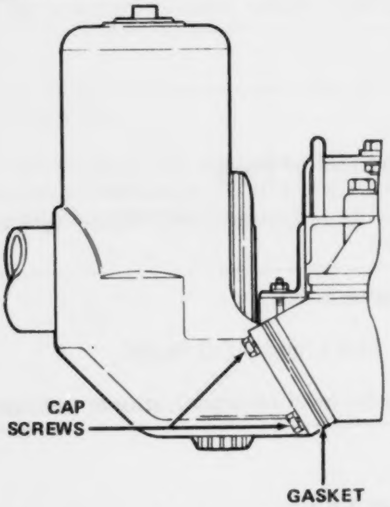
If clogged notify organizational maintenance.





Step 2. Check for air leak at joint between accumulator and pump.

If air leaks are present notify organizational maintenance.



Step 3. Check for air leak or blockage in suction line.

If air leaks or blockage is present notify organizational maintenance.

Section III. MAINTENANCE PROCEDURES

3-2. INTRODUCTION

Operator/crew maintenance consists primarily of the following procedures:

- Checking pump and engine.
- Servicing fuel system.
- Cleaning pump assembly.

3-3. CHECKING PUMP AND ENGINE

Perform the visual and operational checks listed in table 3-2.

Table 3-2. Operational Check

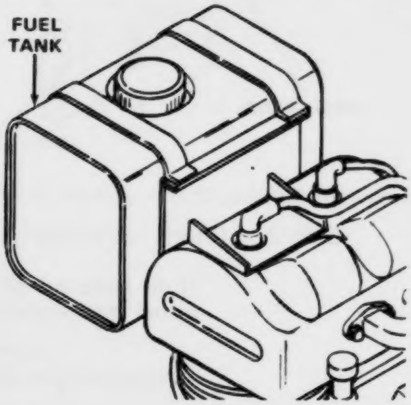
Step	Operation	Normal Indication	Corrective Procedure
1	**Check fuel tank.**	Tank should be full before operation.	Fill fuel tank. 
2	**Check for fuel leaks.**	Fuel system should be free of leaks.	Tighten any loose connections. Report leaking parts to organizational maintenance.
3	**Check engine oil level when engine is hot.**	Oil must be between FULL and ADD levels.	Report low oil level to organizational maintenance.
4	**Check air cleaner.**	Must not be clogged or torn.	Report clogged or damaged air cleaner to organizational maintenance.

Table 3-2. Operational Checks – Continued

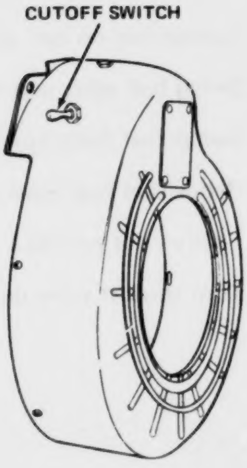
Step	Operation Normal Indication Corrective Procedure
5	**Check spark plug and wire.** Must be free of moisture and dirt. Wipe spark plug and wire clean and dry.
6	**Check frame assembly for cracked welds, bad wheels, or loose parts.** Frame assembly should be free of defects. Tighten loose parts. Notify organizational maintenance for replacement or direct support for repair.
7	**Check tire pressure.** Tire pressure should be 30 psi (207 kPa). Inflate tires.
8	**Check pump hardware.** All hardware must be present and tight. Tighten loose hardware. Report missing hardware to organizational maintenance.
9	**Check gear reducer for oil leaks.** No oil leaks. If oil leaks are present notify organizational maintenance.
10	**Start engine.** Should run smoothly. If engine does not run smoothly, stop engine immediately. Notify organizational maintenance. 

Table 3-2. Operational Checks – Continued

Step	Operation	Normal Indication	Corrective Procedure
11	**Check for abnormal noises.**	Unit should run quietly and smoothly.	If noises are evident notify organizational maintenance.
12	**Check drive operation.**	Operation should be smooth.	Report noisy operation to organizational maintenance.
13	**Check pump for leaks or rust.**	Pump should be free of leaks and rust.	Report leaks or rust condition to organizational maintenance.
14	**Check pump output.**	Fluid flow should be constant.	If flow is not constant, stop engine and clear pump inlet and outlet of obstacles.

3-4. SERVICING FUEL SYSTEM

Check and clean fuel filter before and after operating to prevent an accumulation of moisture, which can freeze.

a. Turn shutoff valve in to OFF.

b. Loosen nut on bail of fuel filter.

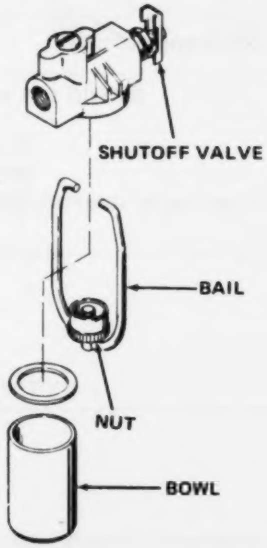
c. Swing bail aside and remove fuel bowl.

d. Dump fuel from bowl and wipe bowl.

e. Reposition fuel bowl and bail.

f. Tighten nut on bail.

g. Turn shutoff valve out to ON.



3-5. CLEANING

CAUTION

Because of the corrosive action of salt water, use fresh water to wash off any salt water that comes in contact with the equipment. This will help prevent the formation of rust and corrosion.

Before storing pump, clean inside and outside of pump with fresh water; wipe exterior dry.

CHAPTER 4

ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

This chapter contains the following frequently used maintenance information:

a. Information on repair parts, special tools, TMDE, and support equipment

b. Instructions for service upon receipt of the pump assembly

c. Lubrication

d. Operational checks

e. Preventive maintenance checks and services (PMCS)

f. Troubleshooting

g. Maintenance procedures

The symptom index on page 4-14 is a guide to the troubleshooting information. There is also an index to the maintenance procedures on page 4-23.

Section	Title	Page
I	Repair Parts, Special Tools, TMDE, and Support Equipment	4-1
II	Service Upon Receipt	4-2
III	Operational Checks	4-5
IV	Preventive Maintenance Checks and Services	4-7
V	Troubleshooting	4-14
VI	Maintenance Procedures	4-23
VII	Preparation for Shipment or Storage	4-84

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

4-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

No special tools, TMDE, or support equipment is required for this pump.

4-3. REPAIR PARTS

Repair parts are listed and illustrated in Appendix C of this manual.

Section II. SERVICE UPON RECEIPT

4-4. SERVICE UPON RECEIPT OF MATERIEL - PUMP ASSEMBLY

Location	Item	Action	Remarks
1. Top of engine	Fuel tank	Ensure tank is in good condition and not leaking.	
2. Side of engine	Fuel filter	Check that fuel filter is present and in good condition.	
3. Side of engine	Fuel lines	Check that fuel lines are present, in good condition, and secure.	
4. Top of engine	Cutoff switch	Check that switch is present and in good condition.	
5. Accumulator	Pipe plug	Check that pipe plug is present and secure	
6. Bottom of pump	Drain plug	Check that drain plug is present and secure.	
7. Pump area	Check valves	Operate check valves by hand to be certain they open and close.	
8. Engine	Various	Refer to engine manual.	See TM 5-2805-257-14.

4-5. SERVICING AND ADJUSTMENT OF EQUIPMENT

a. *Preliminary.* No servicing or adjustment is required for the pump. Refer to TM 5-2805-257-14 for servicing and adjusting the engine.

b. *Lubrication.* Refer to LO 5-4320-275-12 (figure 4-1) for lubrication points, intervals, and detailed instructions.

LUBRICATION ORDER

LO 5-4320-275-12

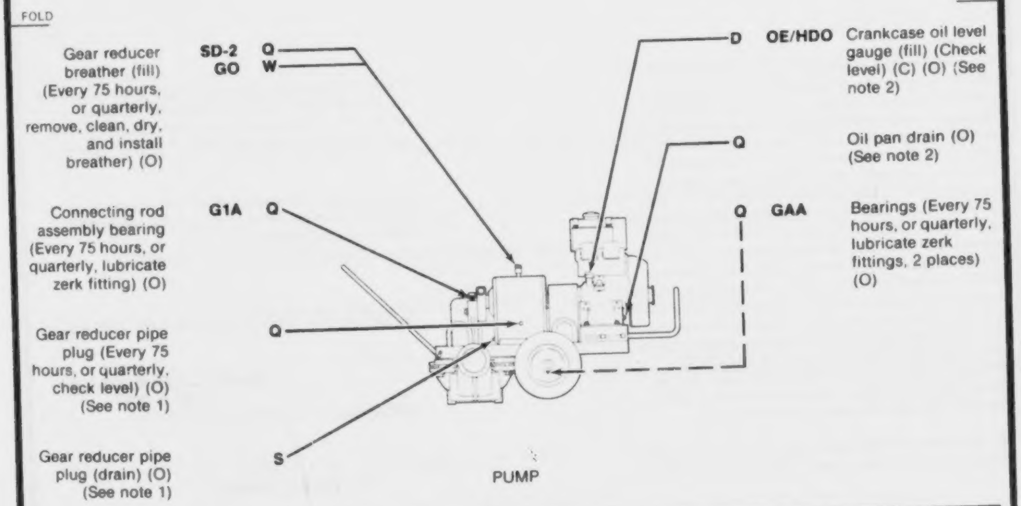
PUMP, RECIPROCATING, POWER-DRIVEN, DIAPHRAGM, GASOLINE-ENGINE-DRIVEN, WHEEL MOUNTED

(US40CDG)

4320-01-092-2210

Reference: TM 5-4320-275-13 & P, C9100-IL

Intervals and the related man-hour times are based on normal operation. The man-hour time specified is the time required to perform all the services prescribed for a particular interval. The interval shall be changed to compensate for abnormal operation and severe operating conditions or contaminated lubricants. The interval may be extended during periods of low level activity, commensurate with adequate preservation precautions. Clean fittings before lubricating. Clean parts with thinner, paint, volatile mineral spirits (EPM), or solvent, dry cleaning (SD). Dry before lubricating. Dotted arrow points indicate lubrication on both sides of the equipment. The lowest level of maintenance authorized to lubricate a point is Organizational Maintenance indicated by the symbol (O). Lubricate all chassis ports after washing or fording. Do not over-lubricate; wipe off excess.


FOLD
FOLD
Gear reducer breather (fill) (Every 75 hours, or quarterly, remove, clean, dry, and install breather) (O)
SD-2 Q
GO W
D
OE/HDO
Crankcase oil level gauge (fill) (Check level) (C) (O) (See note 2)
Q
Oil pan drain (O) (See note 2)
Connecting rod assembly bearing (Every 75 hours, or quarterly, lubricate zerk fitting) (O)
G1A Q
Q GAA
Bearings (Every 75 hours, or quarterly, lubricate zerk fittings, 2 places) (O)
Gear reducer pipe plug (Every 75 hours, or quarterly, check level) (O) (See note 1)
Q
Gear reducer pipe plug (drain) (O) (See note 1)
S
PUMP

TOTAL MAN-HR		TOTAL MAN-HR	
INTERVAL	MAN-HR	INTERVAL	MAN-HR
D	0.1	Q	0.5
S	1.0	W	0.1

Figure 4-1. Lubrication Order (Sheet 1 of 2)

KEY

LUBRICANT	EXPECTED TEMPERATURE				INTERVAL
	Above +32°F	+40°F to -10°F	0°F to -65°F		
OE/HDO (Mil-L-2104, Grade 30 or 10) - Lubricating oil, internal combustion engine, Grade 30 or 10 or **OES** (Mil-L-10295) - Differential final drive	OE/HDO-30	OE/HDO-10	OES	For arctic operation refer to TM9-207	Q - Quarterly, or every 75 hours of operation A - Annually D - Daily
GAA (Mil-G-10924) - Grease, automotive and artillery	All temperatures				
G1A (Mil-G-23827) - Grease, instrument, aircraft					
SD-2 (P-D-680) - Solvent, dry cleaning					
GO-90 (Mil-L-2105, Grade 90) - Lubricating oil, gear, multipurpose					
OE-10 (Mil-L-2104, Grade 10) - Lubricating oil, internal combustion engine					

NOTES

1. GEAR REDUCER. -Sample oil weekly for contamination or breakdown, as indicated by discoloration, excessive foaming, and/or separation of lubricating components. If any of the above conditions is observed, change the oil as described below; if condition of lubricant is satisfactory, the interval between changes is semiannual and oil is changed as described below. Every 75 hours, or quarterly, remove breather and clean with solvent (SD-2), dry, and reinstall. Check level every 75 hours, or quarterly, and replenish as necessary using gear oil (GO-90); accomplish with oil cool. Semiannually, drain gear oil while oil is hot. Remove and inspect drain plug and drained oil for metal particles or filings; if contaminants are found notify direct support maintenance personnel. Remove level plug and breather. After draining is complete install drain plug and fill unit to proper level with OE-10. Run unit for three minutes, if possible, and drain light oil from reducer by removing drain plug. Reinstall drain plug and tighten. Refill, through breather port, with oil (GO-90) until oil flows from level plug. Reinstall level plug and tighten. Reinstall breather and tighten.

2. ENGINE CRANKCASE AND OIL PAN. -Check engine oil level daily; check with oil cool. With engine cool replenish oil, as required, using OE/HDO; reinstall level gauge. Every 150 hours, or semiannually, remove crankcase drain while the engine is hot and drain the oil. Inspect drain plug and oil for metal particles or filings; if contaminants are found notify direct support maintenance personnel. Install drain plug, and tighten. Fill oil pan with oil (OE/HDO or OES). See KEY above.

Copy of this lubrication order will remain with the equipment at all times; instructions contained herein are mandatory.

BY ORDER OF THE SECRETARY OF THE ARMY

General, United States Army,
Chief of Staff.

OFFICIAL

The Adjutant General.

Figure 4-1. Lubrication Order (Sheet 2 of 2)

Section III. OPERATIONAL CHECKS

4-6. OPERATIONAL CHECKS

Perform the visual and operational checks listed in table 4-1.

Table 4-1. Operational Checks

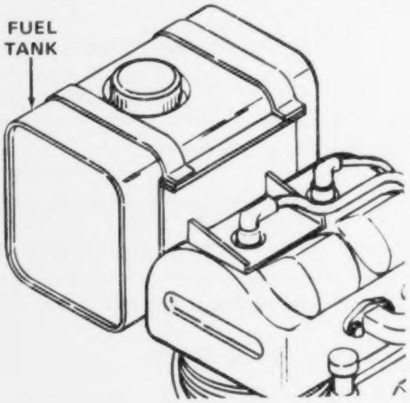
Step	Operation	Normal Indication	Corrective Procedure
1	**Check fuel tank.**	Tank should be full before operation.	Fill fuel tank. 
2	**Check for fuel leaks.**	Fuel system should be free of leaks.	Tighten any loose connections. Replace leaking parts.
3	**Check engine oil level when engine is hot.**	Oil must be between FULL and ADD levels.	Refer to LO 5-4320-275-12 (figure 4-1) to add oil.
4	**Check engine air cleaner.**	Must not be clogged or torn.	See TM 5-2805-257-14 for replacement procedure.
5	**Check spark plug and wire.**	Must be free of moisture and dirt.	Wipe spark plug and wire clean and dry.

Table 4-1. Operational Checks – Continued

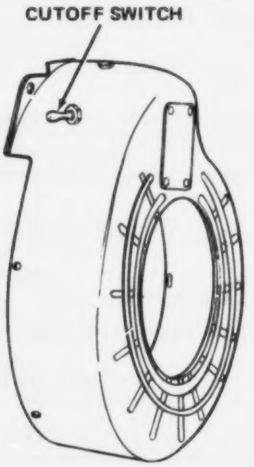
Step	Operation Normal Indication Corrective Procedure
6	**Check frame assembly for cracked welds, bad wheels, or loose parts.** Frame assembly and wheels should be free of defects. Tighten loose parts. Replace defective parts or send to direct support for repair.
7	**Check tire pressure.** Tire pressure should be 30 psi (207 kPa). Inflate tires.
8	**Check pump hardware.** All hardware must be present and tight. Install and/or tighten hardware.
9	**Check gear reducer for oil leaks.** No oil leaks. Replace gear reducer or send to direct support for repair.
10	**Start engine.** Should run smoothly. Stop engine immediately. See TM 5-2805-257-14. 
11	**Check for abnormal noises in engine.** Engine should run consistently. See TM 5-2805-257-14.

Table 4-1. Operational Checks – Continued

Step	Operation	Normal Indication	Corrective Procedure
12	**Check drive operation.**	Operation should be smooth.	Replace noisy parts.
13	**Check pump for leaks or rust.**	Pump should be free of leaks and rust.	Replace defective parts.
14	**Check pump output.**	Pump should deliver approximately 100 gpm (38400 phr).	Clear pump inlet and outlet of obstacles.

Section IV. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

4-7. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

Table 4-2 lists the preventive maintenance checks and services which shall be performed at specified intervals by organizational maintenance personnel. It includes and expands upon the preventive maintenance services performed by operator/crew maintenance and includes additional services which are allocated to organizational maintenance.

NOTE

Item numbers in the following table shall be used as source of item numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

Table 4-2. Organizational Preventive Maintenance Checks and Services

M—Monthly Q—Quarterly S—Semiannually

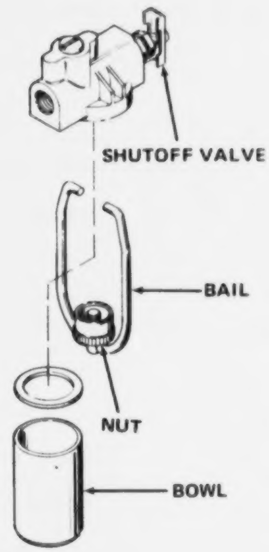
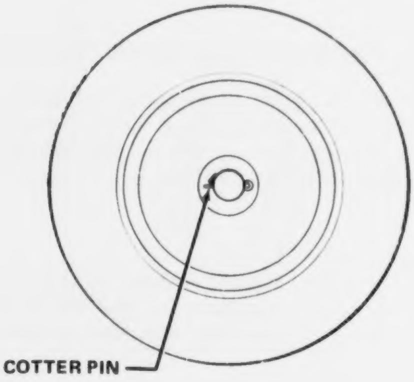
Item No.	Interval			Item To Be Inspected	Procedures
	M	Q	S		
1	●			Engine oil.	Check that engine oil has been changed at required interval. See LO 5-4320-275-12 (figure 4-1).
2	●			Fuel system.	Check for leaks.
3	●			Fuel filter.	Clean fuel filter. Turn shutoff valve in to OFF. Loosen nut on bail of fuel filter. Swing bail aside and remove fuel bowl. Dump fuel from bowl and wipe clean. Reposition fuel bowl and bail. Tighten nut on bail. Turn shutoff valve out to ON. 
4	●			Wheels.	Check that cotter pin is securely holding wheel on axle. Replace if missing. Put cotter pin through hole in axle. Bend one end of cotter pin along the contour of the axle. 
5	●			Wheels.	Clean and check for damage. Check that wheel bearings have been lubricated in accordance with LO 5-4320-275-12 (figure 4-1).

Table 4-2. Organizational Preventive Maintenance Checks and Services – Continued

M–Monthly Q–Quarterly S–Semiannually

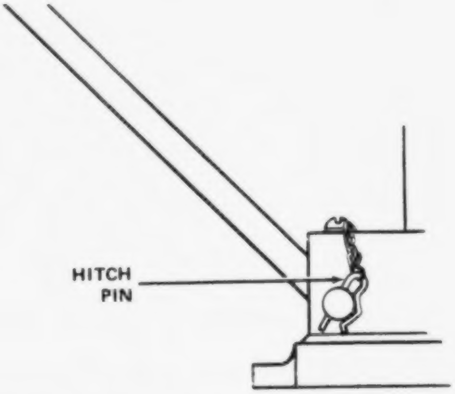
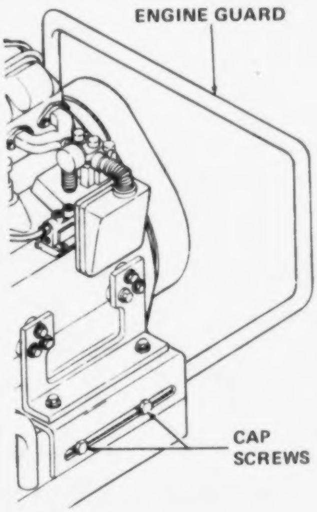
Item No.	Interval			Item To Be Inspected	Procedures
	M	Q	S		
6	●			Tires.	Inspect tires for proper inflation and condition. Repair or replace tire assembly as necessary. Inflate tires to 30 psi (207 kPa).
7	●			Draw bar.	Check that hitch pins are in position through ends of draw bar. 
8	●			Engine guard.	Check that cap screws holding engine guard to frame are tight. 

Table 4-2. Organizational Preventive Maintenance Checks and Services – Continued

M–Monthly Q–Quarterly S–Semiannually

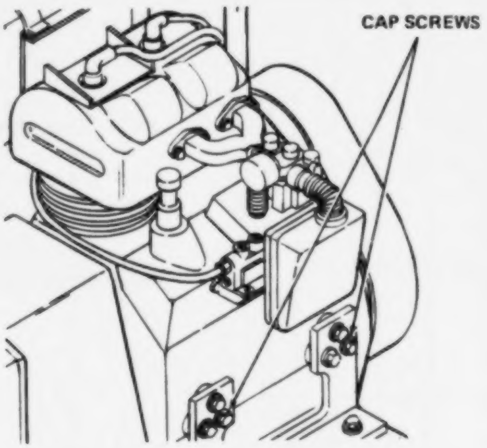
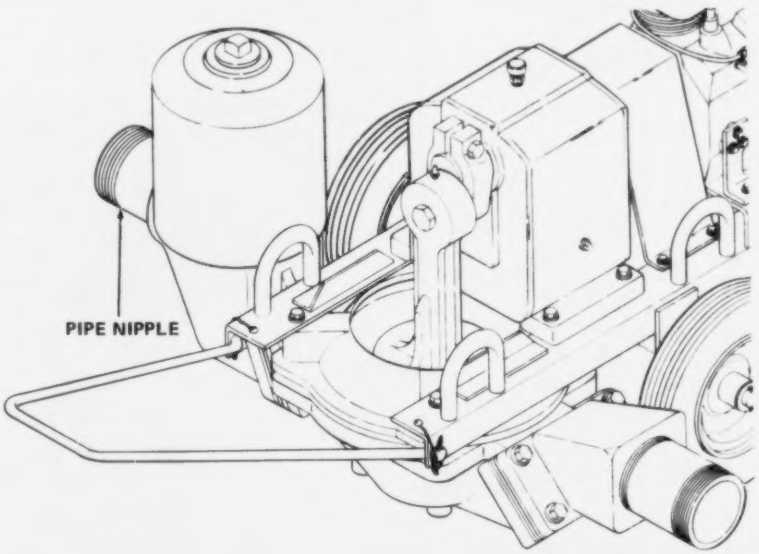
Item No.	Interval			Item To Be Inspected	Procedure
	M	Q	S		
9		•		Engine screws.	Check that cap screws holding engine to engine mount are tight. 
10			•	Frame assembly.	Check for cracks or broken welds.
11	•			Pump assembly.	Check inlet and outlet pipe nipples for leaks, cracks, or damage. Replace any damaged pipe nipple. 
12	•			Check valves.	Start the engine and listen to the operation of the check valves. Check valves must open and close during normal operation. If check valves do not open and close, check for an obstruction in the accumulator or the discharge port, then

Table 4-2. Organizational Preventive Maintenance Checks and Services – Continued

M–Monthly Q–Quarterly S–Semiannually

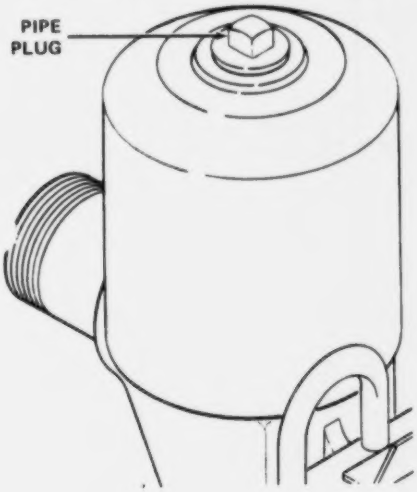
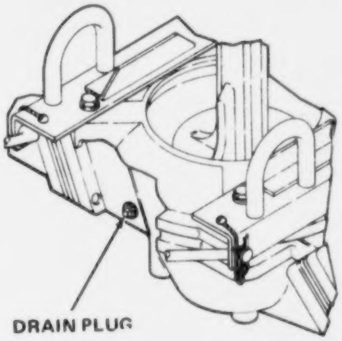
Item No.	Interval			Item To Be Inspected	Procedures
	M	Q	S		
					recheck. If one check valve does not operate properly, replace the check valve in accordance with paragraph 4-19 and 4-20. If both check valves do not operate properly, replace the diaphragm in accordance with paragraph 4-21.
13	•			Accumulator.	Check that pipe plug on accumulator is tight. 
14	•			Pump bowl.	Check that drain plug on pump bowl is tight. 

Table 4-2. Organizational Preventive Maintenance Checks and Services – Continued

M–Monthly Q–Quarterly S–Semiannually

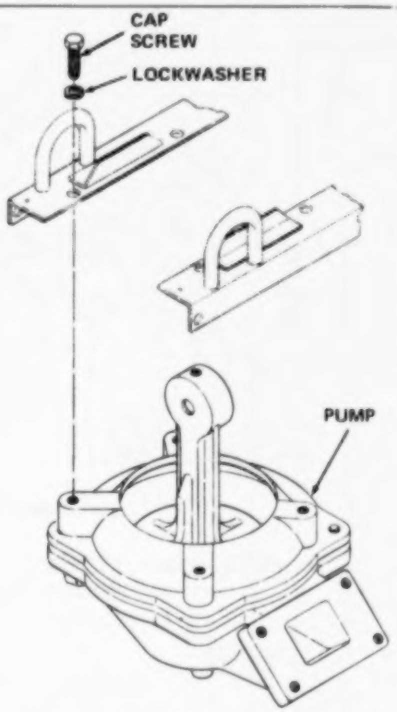
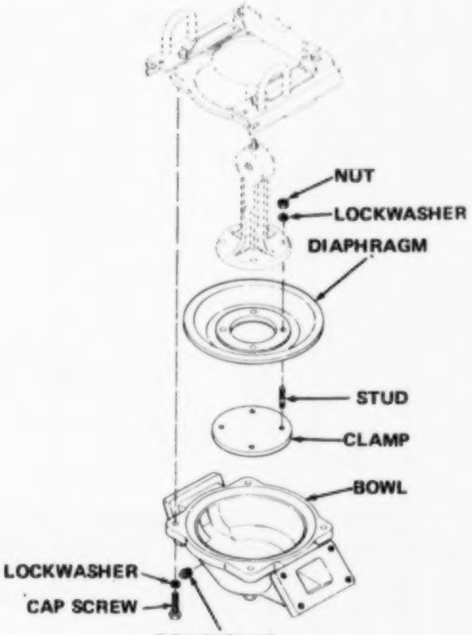
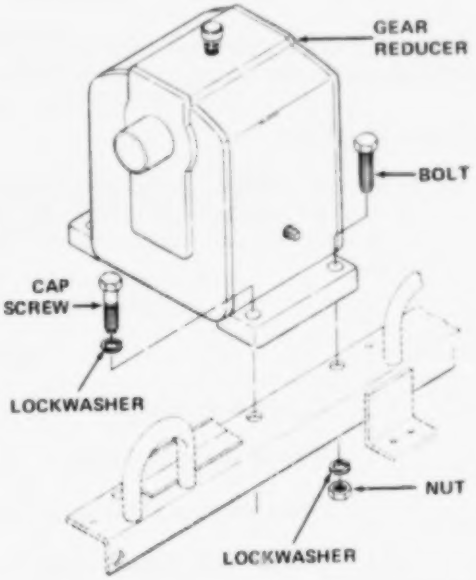
Item No.	Interval			Item To Be Inspected	Procedures
	M	Q	S		
15			●	Pump screws.	Check that cap screws holding pump to frame are tight.  CAP SCREW LOCKWASHER PUMP
16			●	Diaphragm clamp nuts.	Check that nuts holding diaphragm between connecting rod assembly and clamp are tight.  NUT LOCKWASHER DIAPHRAGM STUD CLAMP BOWL LOCKWASHER CAP SCREW DRAIN PLUG

Table 4-2. Organizational Preventive Maintenance Checks and Services – Continued

M–Monthly Q–Quarterly S–Semiannually

Item No.	Interval			Item To Be Inspected	Procedures
	M	Q	S		
17			•	Diaphragm.	Check that diaphragm is not torn. Replace a torn diaphragm in accordance with paragraph 4-21.
18			•	Gear reducer screws.	Check that cap screws and nuts holding gear reducer to frame are tight.  GEAR REDUCER BOLT CAP SCREW LOCKWASHER NUT LOCKWASHER
19		•		Gear reducer.	Check that gear reducer runs quietly and without restriction. Replace the gear reducer in accordance with paragraph 4-26 if it is noisy or if shaft rotation is restricted.
20			•	Gear reducer.	Check that gear reducer oil has been changed at required interval. See LO 5-4320-275-12 (figure 4-1).

Section V. TROUBLESHOOTING

4-8. TROUBLESHOOTING

a. Table 4-3 contains troubleshooting information for locating and correcting most of the operating troubles which are the responsibility of organizational maintenance. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. Perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. Only those functions within the scope of organizational maintenance are listed. For troubleshooting procedures within the scope of operator/crew maintenance, refer to table 3-1.

4-9. SYMPTOM INDEX

Refer to the Symptom Index below. Locate the malfunction which is the same, or most nearly the same, as the trouble you are having with the pump. The Symptom Index lists the first page of troubleshooting information for that malfunction. Follow the steps one by one, and perform the corrective actions listed.

Malfunction Number	Description	Page
1	Engine fails to start	4-15
2	Engine starts, but stalls	4-18
3	Pump fails to prime, or has low output (engine running well)	4-21
4	Suction leak between accumulator and bowl	4-22

Table 4-3. Organizational Maintenance Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. ENGINE FAILS TO START

Step 1. Check for empty fuel tank.

WARNING

- **Allow engine to cool before filling with fuel.**
- **Perform maintenance outdoors or in a well-ventilated area to avoid illness caused by inhalation of fuel fumes.**
- **Severe burns, illness, or death can result from improper handling of gasoline.**
- **Do not inhale vapors.**
- **Do not work near open flame, sparks, or excessive heat.**

Fill fuel tank.

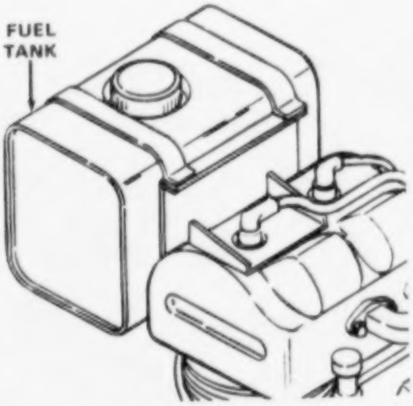


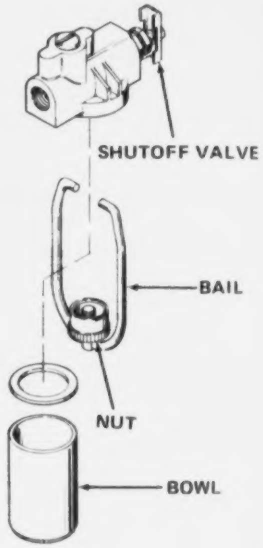
Table 4-3. Organizational Maintenance Troubleshooting – Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Check for water or dirt in fuel filter bowl.

WARNING

- **Allow engine to cool before draining fuel.**
- **Perform maintenance outdoors or in a well-ventilated area to avoid illness caused by inhalation of fuel fumes.**
- **Severe burns, illness, or death can result from improper handling of gasoline.**
- **Do not inhale vapors.**
- **Do not work near open flame, sparks, or excessive heat.**



Turn shutoff valve in to OFF. Drain contents of fuel line into drain pan. Use 1/2 inch and 9/16 inch wrenches to remove fuel line from fitting on engine fuel pump. After draining, attach fuel line to fitting on engine fuel pump. Fill fuel tank with fresh fuel. Turn shutoff valve out to ON.

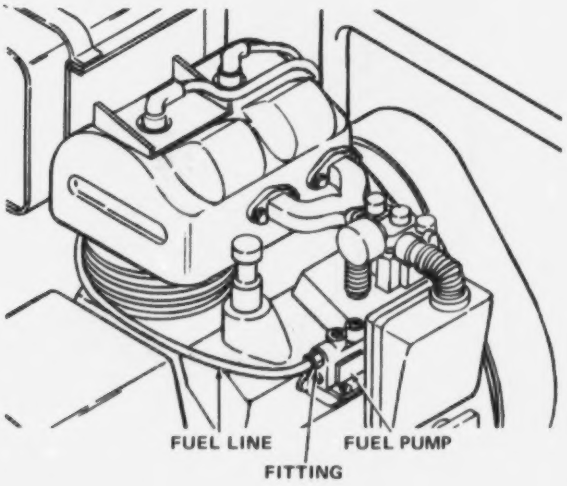


Table 4-3. Organizational Maintenance Troubleshooting – Continued

---

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. Check for clogged fuel line.

WARNING

- **Allow engine to cool before filling with fuel.**
- **Perform maintenance outdoors or in a well-ventilated area to avoid illness caused by inhalation of fuel fumes.**
- **Severe burns, illness, or death can result from improper handling of gasoline.**
- **Do not inhale vapors.**
- **Do not work near open flame, sparks, or excessive heat.**

Turn shutoff valve in to OFF. Drain contents of fuel line into drain pan. Use 1/2 inch and 9/16 inch wrenches to remove fuel line from fitting on engine fuel pump. Use 1/2 inch wrench to remove fuel line from fuel filter. Remove clogged material from fuel line by gently probing with a blunt end rigid wire. If the clogging material cannot be removed, or if the fuel line is damaged, replace the fuel line. Use 1/2 inch wrench to attach fuel line to fuel filter. Attach fuel line to fitting on engine fuel pump. Turn shutoff valve out to ON.

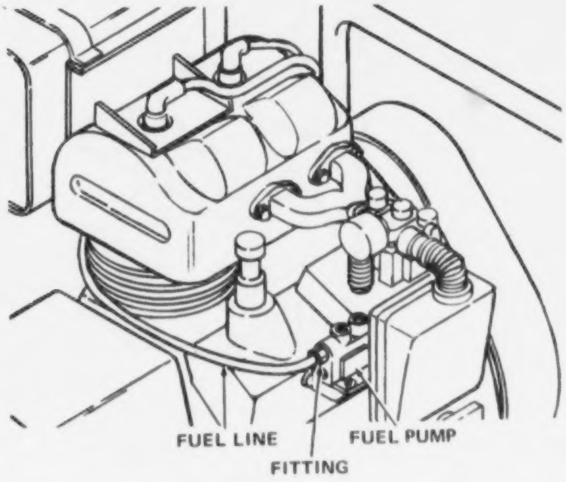


Table 4-3. Organizational Maintenance Troubleshooting – Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

2. ENGINE STARTS, BUT STALLS

Step 1. Check for empty fuel tank.

WARNING

- **Allow engine to cool before filling with fuel.**
- **Perform maintenance outdoors or in a well-ventilated area to avoid illness caused by inhalation of fuel fumes.**
- **Severe burns, illness, or death can result from improper handling of gasoline.**
- **Do not inhale vapors.**
- **Do not work near open flame, sparks, or excessive heat.**

Fill fuel tank.

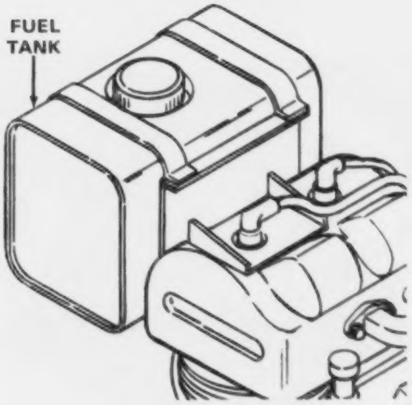


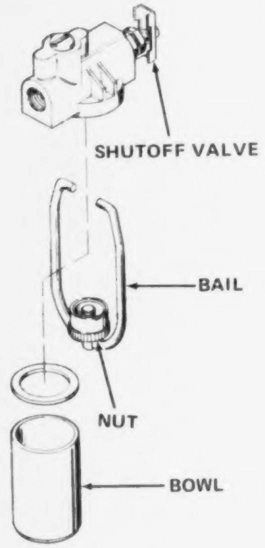
Table 4-3. Organizational Maintenance Troubleshooting – Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 2. Check for water or dirt in fuel filter bowl.

WARNING

- **Allow engine to cool before draining fuel.**
- **Perform maintenance outdoors or in a well-ventilated area to avoid illness caused by inhalation of fuel fumes.**
- **Severe burns, illness, or death can result from improper handling of gasoline.**
- **Do not inhale vapors.**
- **Do not work near open flame, sparks, or excessive heat.**



Turn shutoff valve in to OFF. Drain contents of fuel line into drain pan. Use 1/2 inch and 9/16 inch wrenches to remove fuel line from fitting on engine fuel pump. After draining, attach fuel line to fitting on engine fuel pump. Fill fuel tank with fresh fuel. Turn shutoff valve out to ON.

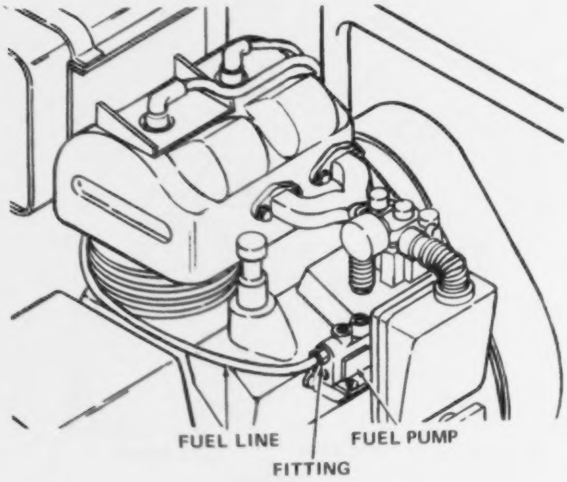


Table 4-3. Organizational Maintenance Troubleshooting – Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. Check for clogged fuel line.

WARNING

- **Allow engine to cool before filling with fuel.**
- **Perform maintenance outdoors or in a well-ventilated area to avoid illness caused by inhalation of fuel fumes.**
- **Severe burns, illness, or death can result from improper handling of gasoline.**
- **Do not inhale vapors.**
- **Do not work near open flame, sparks, or excessive heat.**

Turn shutoff valve in to OFF. Drain contents of fuel line into drain pan. Use 1/2 inch and 9/16 inch wrenches to remove fuel line from fitting on engine fuel pump. Use 1/2 inch wrench to remove fuel line from fuel filter. Remove clogged material from fuel line by gently probing with a blunt end rigid wire. If the clogging material cannot be removed, or if the fuel line is damaged, replace the fuel line. Use 1/2 inch wrench to attach fuel line to fuel filter. Attach fuel line to fitting on engine fuel pump.

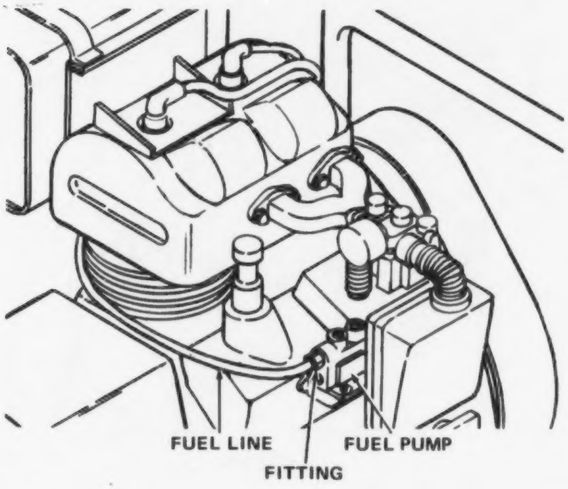


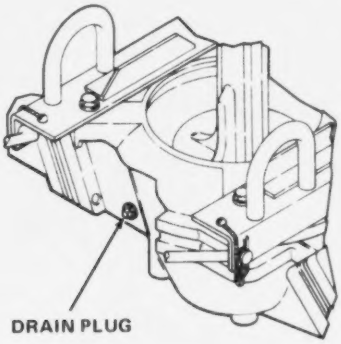
Table 4-3. Organizational Maintenance Troubleshooting – Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. PUMP FAILS TO PRIME, OR HAS LOW OUTPUT (ENGINE RUNNING WELL)

Step 1. Check for loose drain plug on bowl.

Use 5/8 inch wrench to tighten drain plug.



Step 2. Check for loose pipe plug on accumulator.

Use 1-1/4 inch wrench to tighten pipe plug.

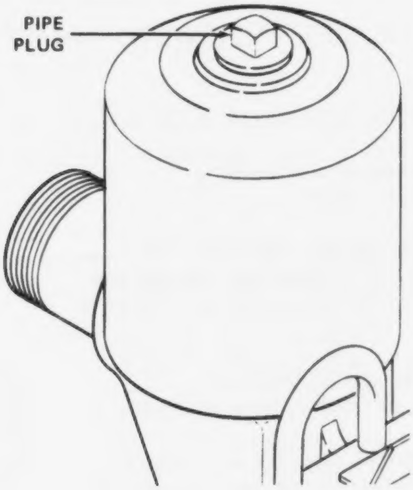
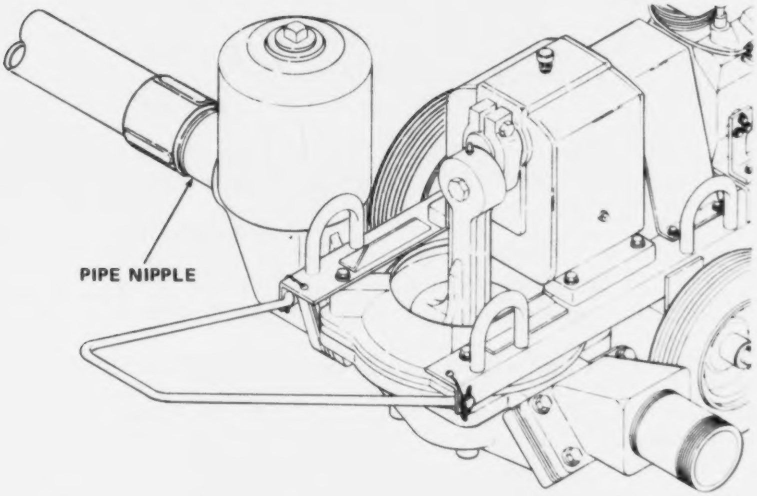


Table 4-3. Organizational Maintenance Troubleshooting – Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. Check for leaks in suction hose by inspecting all parts of suction hose for cracks or other damage.

Replace damaged suction hose. Tighten suction hose on accumulator pipe nipple.



4. SUCTION LEAK BETWEEN ACCUMULATOR AND BOWL

Step 1. Check for loose screws holding accumulator on bowl.

Tighten cap screws. Use 3/4 inch socket with a torque wrench and tighten the four cap screws to a torque of 40 ft lb (54 N·m).

Step 2. Check for bad gasket between accumulator and check valve assembly.

Replace gasket. Use 3/4 inch socket and handle to remove four cap screws holding accumulator on bowl. Remove accumulator and gasket. Install new gasket between accumulator and check valve assembly. Use 3/4 inch socket with a torque wrench and tighten the four cap screws to a torque of 40 ft lb (54 N·m). Use Loctite (Item 7, Appendix D) on threads.

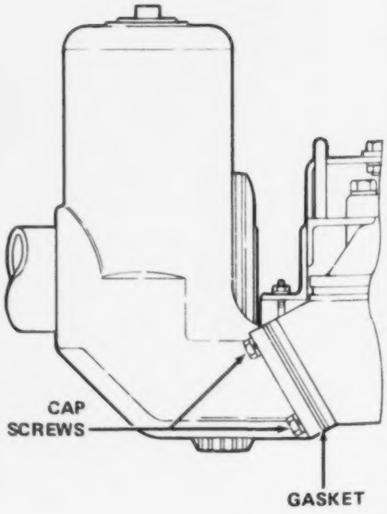
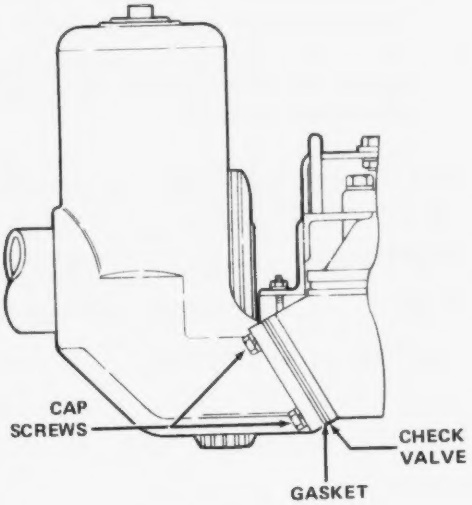


Table 4-3. Organizational Maintenance Troubleshooting – Continued

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 3. Check for defective check valve assembly on accumulator side of bowl.

Replace check valve assembly. Use 3/4 inch socket and handle to remove four cap screws holding accumulator on bowl. Remove accumulator, gasket, and check valve assembly. Install a new gasket and check valve assembly. Use 3/4 inch socket with a torque wrench and tighten the four cap screws to a torque of 40 ft lb (54 N·m). Use Loctite (Item 7, Appendix D) on threads.



Section VI. MAINTENANCE PROCEDURES

INDEX

	Para
Accumulator	4-19
Axle	4-16
Bowl, pump	4-23
Clamp assembly	4-22
Connecting rod assembly	4-24
Coupling	4-25
Data plates	4-18
Diaphragm	4-21
Discharge port	4-20
Engine	4-12
Filter, fuel	4-13
Frame assembly	4-16
Fuel	
Filter	4-13
Line	4-15
Strainer	4-14
Tank	4-14
Gear reducer	4-26
Identification plate	4-18
Inspection	4-11
Operating plate	4-18
Plates, data	4-18
Port, discharge	4-20
Pump bowl	4-23
Reducer, gear	4-26
Rod assembly, connecting	4-24
Strainer, fuel	4-14
Tires	4-17
Tubes, inner	4-17
U-bolts	4-16
Wheel assembly	4-17

4-10. GENERAL INSTRUCTIONS

Most maintenance instructions in this section will list resources required, personnel required, and equipment condition for the start of the procedure. Note the following:

- Resources required are not listed unless they apply to the procedure.
- Personnel required are listed only if the task requires more than one. If PERSONNEL is not listed, it means one person can do the task.
- The normal standard equipment condition to start a maintenance task is engine stopped and cutoff switch off. EQUIPMENT CONDITION is not listed unless some other condition is required besides the power being off.

4-11. PUMP ASSEMBLY INSPECTION

Component	Acceptable	Repairable	Not Repairable
Engine	Attaching screws tight.	Loose screws.	Stripped screw holes.
Fuel filter	Clean.	Dirty.	Stripped threads or broken.
Fuel tank	No leaks.	Replace tank.	None.
Fuel line	No leaks.	Tighten fuel lines.	Leak in fuel line.
Wheel assembly	Tight. No air leaks.	Replace leaking tires.	None.
Frame assembly	No cracks.	None.	---
Data plates	Legible. Tight.	Replace.	---
Accumulator	No leaks.	Replace gasket.	Crack in accumulator.
Pipe plug	Tight. No leaks.	Tighten pipe plug.	---
Check valve assembly	No leaks. Operable.	Replace valve assembly.	None.
Bowl pipe plug	Tight. No leaks.	Tighten pipe plug.	---
Diaphragm	No leaks.	Replace diaphragm.	None.
Discharge port	No leaks.	Replace gasket.	Crack in discharge port.
Clamp assembly	Tight.	Loose nuts.	Stripped threads on studs.
Connecting rod assembly	Tight.	Loose shoulder bolt.	Bent or cracked rod.
Coupling	Minimal backlash.	Replace coupling.	None.
Gear reducer	No binding.	Replace gear reducer.	None.

4-12. ENGINE

This task covers:

a. Shutting off fuel supply to engine.

b. Removing engine.

c. Installing engine.

INITIAL SETUP

Test Equipment

None

Tools

Tool kit, general mechanics automotive, NSN 5180-00-177-7033

- Wrench, 7/16 inch, or
- Socket, 7/16 inch and handle
- Wrench, 9/16 inch, or
- Socket, 9/16 inch and handle
- Key, hex drive, 5/32 inch
- Puller, mechanical, gear and bearing

Shop equipment, automotive maintenance and repair, NSN 4910-00-754-0654

- Torque wrench, 0-175 ft lb (0-250 N·m)

Materials/Parts

Gasoline engine (Appendix C, item 3, fig. 1)

Fuel tank assembly (Appendix C, item 4, fig. 2)

Key (Appendix C, item 20, fig. 8)

Loctite (Item 7, Appendix D)

Personnel Required: 2

Mechanic will assist in lifting engine.

References

None

Troubleshooting References

None

Special Environmental Conditions

Well-ventilated area required when gasoline is handled.

General Safety Instructions

Allow engine to cool before performing any maintenance.

ENGINE (CONT)

Location/Item	Action	Remarks

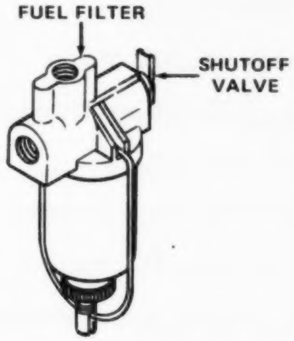
REMOVAL

WARNING

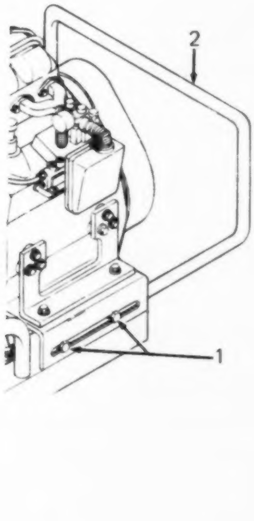
Severe burns, illness, or death can result from improper handling of gasoline. When working with gasoline:

- **Do not inhale vapors.**
- **Work in well-ventilated area.**
- **Do not work near open flame, sparks, or excessive heat.**

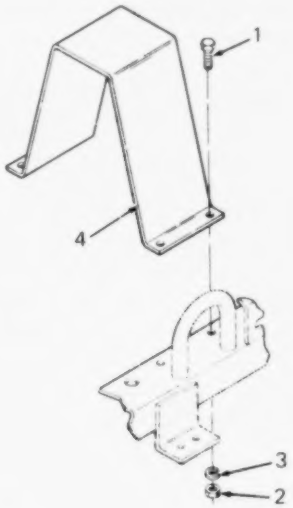
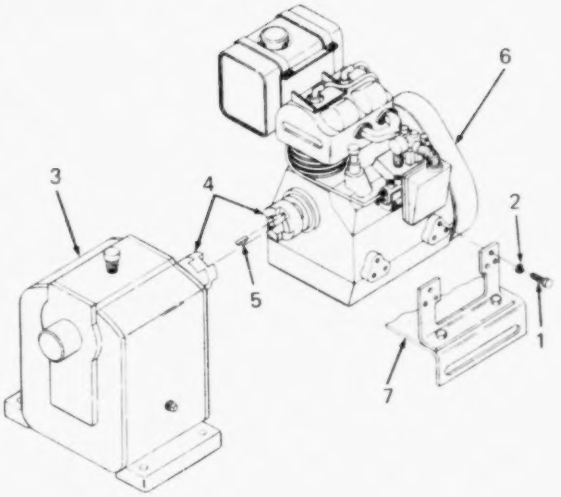
Location/Item	Action	Remarks
1. Fuel filter	Turn shutoff valve in to OFF.	



Location/Item	Action	Remarks
2. Engine guard	Loosen 4 cap screws (1) with 9/16 inch wrench. Pull engine guard (2) away from engine.	



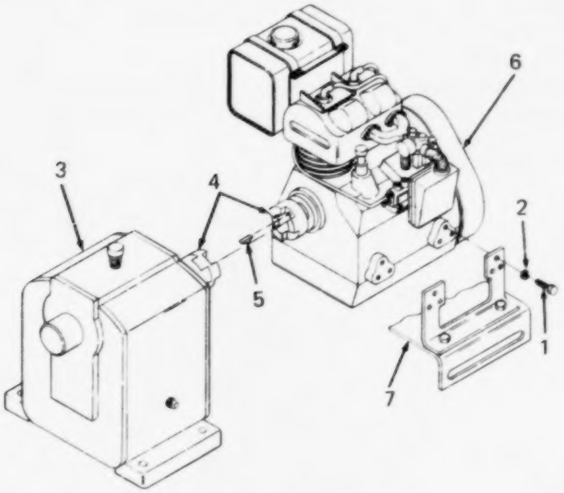
ENGINE (CONT)

Location/Item	Action	Remarks
3. Coupling guard	Use 7/16 inch socket and handle to remove 4 cap screws (1) and lockwashers (3). Hold nuts (2) with 7/16 inch wrench. Remove coupling guard (4) by lifting straight up.	
4. Engine	Use 7/16 inch wrench to remove 12 cap screws (1) and lockwashers (2) from engine (6). Slide engine away from gear reducer (3). Use a 5/32 inch hex key to loosen setscrew in engine coupling (4) half. Remove coupling half from engine. Remove and discard key (5). Lift engine (6) off frame (7).	

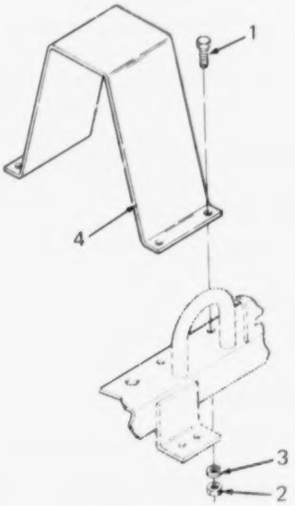
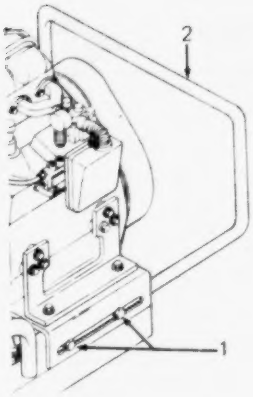
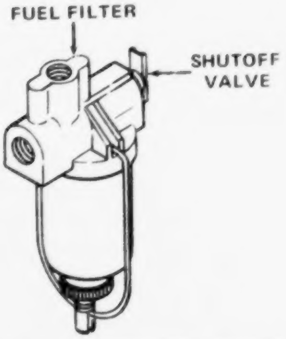
NOTE

It may be necessary to use a mechanical gear and bearing puller to remove coupling half from engine.

ENGINE (CONT)

Location/Item	Action	Remarks
DISASSEMBLY		
5. Engine	This manual contains no engine disassembly instructions. See TM 5-2805-257-14 for engine disassembly.	
CLEANING		
6. Engine	This manual contains no engine cleaning instructions. See TM 5-2805-257-14 for engine cleaning.	
INSTALLATION		
7. Engine	Install new key (5) in engine shaft groove. Install half of coupling (4) onto key (5) and engine shaft. Use a 5/32 inch hex key to tighten setscrew on coupling (4). Slide engine (6) toward gear reducer (3) and align coupling halves.  	
8. Torque cap screws	Install lockwashers (2) on cap screws (1). Use Loctite on threads. Tighten 12 cap screws to 4 ft lb (5 N·m).	

ENGINE (CONT)

Location/Item	Action	Remarks
9. Coupling guard	Position coupling guard (4) over coupling and align holes with frame holes. Install 4 cap screws (1), lockwashers (3), and nuts (2). Use Loctite on threads. Hold nuts (2) with 7/16 inch wrench and tighten cap screws (1) with 7/16 inch socket and handle.	
10. Engine guard	Slide engine guard (2) toward engine. Position engine guard so it is clear of engine starting pulley. Tighten cap screws (1).	
11. Torque cap screws	Tighten 4 cap screws (1) to 4 ft lb (5 N·m).	
12. Fuel filter	Turn shutoff valve out to ON.	

4-13. FUEL FILTER

This task covers:

a. Shutting off fuel supply.

b. Disassembling fuel filter.

c. Cleaning fuel filter.

d. Assembling fuel filter.

INITIAL SETUP

Test Equipment

None

Tools

None

Materials/Parts

Fuel filter (Appendix C, item 15, fig. 2)

Dry cleaning solvent, P-D-680

References

None

Troubleshooting References

Malfunction 1, step 2

Malfunction 2, step 2

Special Environmental Conditions

Well-ventilated area required when gasoline or solvent is handled.

General Safety Instructions

None

FUEL FILTER (CONT)

Location/Item	Action	Remarks

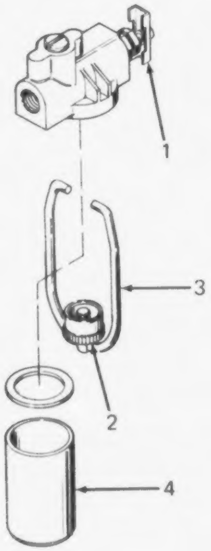
DISASSEMBLY

WARNING

Severe burns, illness, or death can result from improper handling of gasoline. When working with gasoline:

- **Do not inhale vapors.**
- **Work in well-ventilated area.**
- **Do not work near open flame, sparks, or excessive heat.**

Location/Item	Action	Remarks
1. Shutoff valve	Turn shutoff valve (1) in to OFF.	
2. Nut	Loosen nut (2) on bail.	
3. Bail and bowl	Swing bail (3) aside and remove fuel bowl (4).	



CLEANING

WARNING

Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed. spec. P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

Location/Item	Action	Remarks
4. Bowl	Clean inside of bowl with dry cleaning solvent, P-D-680, and wipe dry.	

FUEL FILTER (CONT)

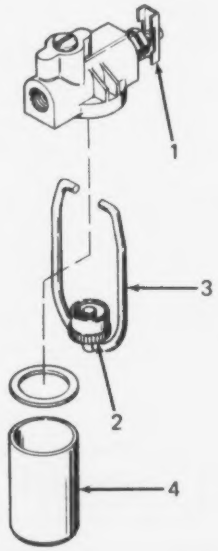
Location/Item	Action	Remarks
5. Exterior of fuel filter	Clean outside of fuel filter with dry cleaning solvent, P-D-680. Use a soft-bristle brush to remove caked dirt.	

ASSEMBLY

CAUTION

Be certain top of bowl is clean of any foreign material when assembling on fuel filter.

Location/Item	Action	Remarks
6. Bowl and bail	Set bowl (4) on fuel filter and swing bail (3) to hold bowl.	
7. Nut	Tighten nut (2) on bail.	
8. Shutoff valve	Turn shutoff valve (1) out to ON.	



4-14. FUEL TANK

This task covers:

a. Draining fuel tank.

b. Removing fuel tank.

c. Strainer replacement.

d. Installing fuel tank.

INITIAL SETUP

Test Equipment

None

Tools

Tool kit, general mechanics automotive, NSN 5180-00-177-7033

Screwdriver, flat tip

Wrench, 7/16 inch

Wrench, 3/8 inch, or

Socket, 3/8 inch, and handle

Wrench, 1/2 inch

Wrench, 9/16 inch

Drain pan

Materials/Parts

Fuel tank (Appendix C, item 4, fig. 2)

Loctite (Item 7, Appendix D)

References

None

Troubleshooting References

None

Equipment Condition

Fuel filter shutoff valve OFF.

Special Environmental Conditions

Well-ventilated area required when gasoline is handled.

General Safety Instructions

WARNING

- **Be certain fuel tank is empty before removing from engine.**
- **Allow engine to cool before performing any maintenance.**
- **Perform maintenance outdoors or in a well-ventilated area to avoid illness caused by inhalation of fuel fumes.**

FUEL TANK (CONT)

Location/Item	Action	Remarks

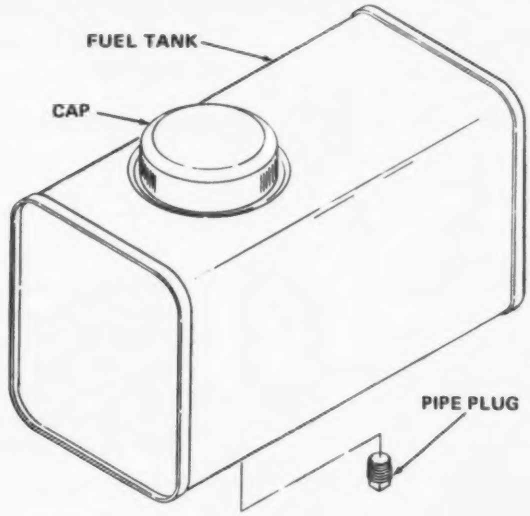
REMOVAL

WARNING

Severe burns, illness, or death can result from improper handling of gasoline. When working with gasoline:

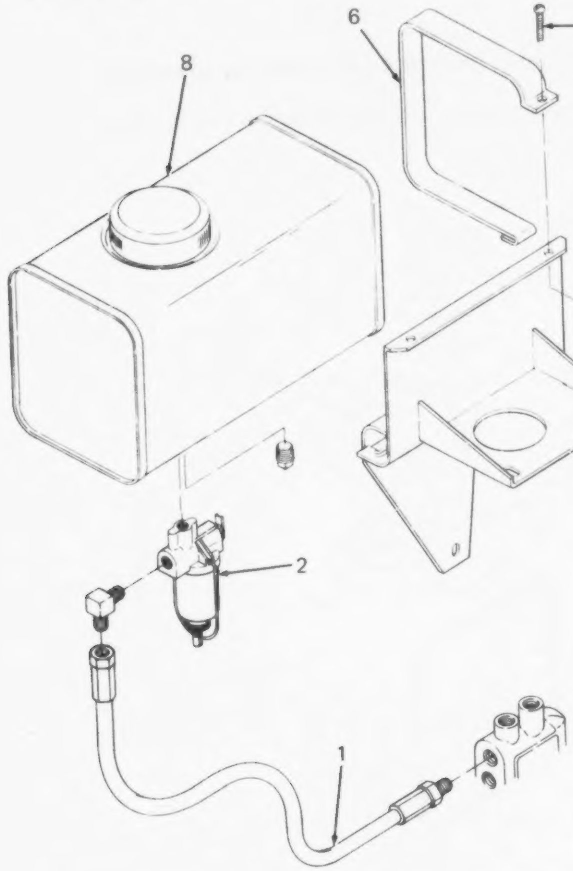
- **Do not inhale vapors.**
- **Work in well-ventilated area.**
- **Do not work near open flame, sparks, or excessive heat.**

1. Pipe plug	Drain contents of fuel tank into drain pan. Use 7/16 inch wrench to remove pipe plug.	



2. Cap	Remove fuel tank cap.	

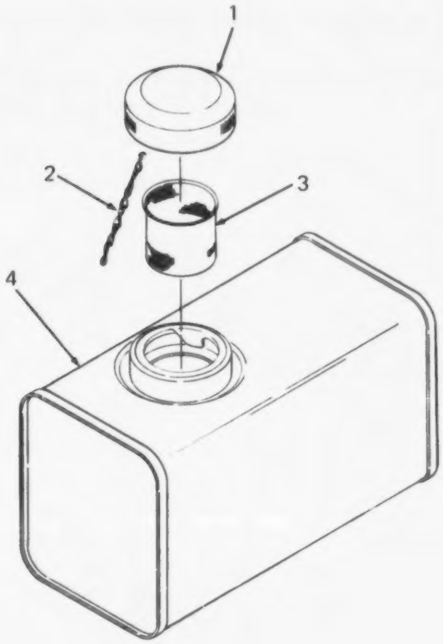
FUEL TANK (CONT)

Location/Item	Action	Remarks
3. Fuel line	Drain contents of fuel line into drain pan. Use 1/2 inch wrench to hold fuel line assembly (1). Use a 9/16 inch wrench to turn swivel fitting on engine fuel pump. Then remove fuel line assembly (1) from fuel filter (2) with a 1/2 inch wrench.  	
4. Remove screws	Use screwdriver to hold two screws (5). Use 3/8 inch wrench to remove two nuts (3). Remove lockwashers (4).	
5. Remove straps	Remove two straps (6) from bracket (7). Remove fuel tank (8).	

FUEL TANK (CONT)

STRAINER REPLACEMENT

Location/Item	Action	Remarks
6. Remove strainer	Unscrew cap (1). Remove strainer (3) from tank (4).	
	NOTE **Cap is secured to fuel tank by chain (2).**	
7. Install strainer	Insert new strainer (3) into tank (4). Install cap (1).	

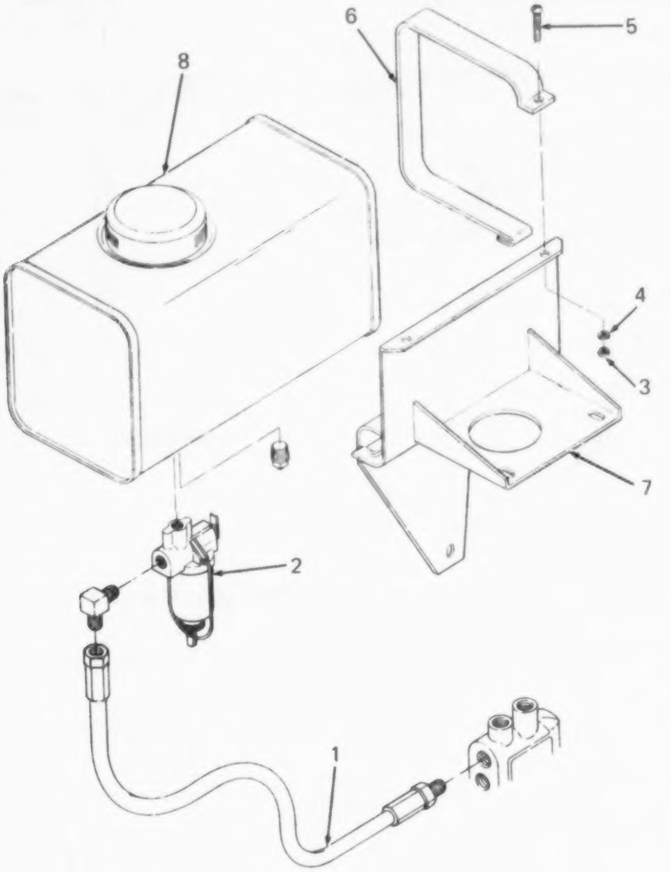


FUEL TANK (CONT)

Location/Item	Action	Remarks

INSTALLATION

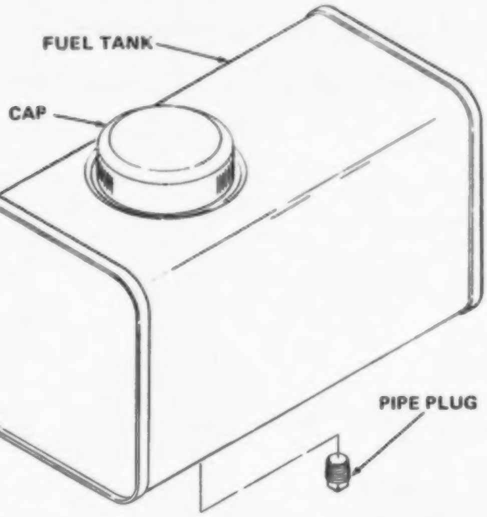
Location/Item	Action	Remarks
8. Install straps	Slide straps (6) over each end of the fuel tank (8). Install straps (6) with fuel tank (8) on bracket (7).	



Location/Item	Action	Remarks
9. Install screws	Insert screws (5) through ends of straps (6). Install lockwashers (4) and nuts (3). Use Loctite on threads.	
10. Tighten screws	Use 3/8 inch wrench to hold nuts (3). Use screwdriver to tighten each screw (5).	

FUEL TANK (CONT)

Location/Item	Action	Remarks
11. Fuel line	Use 1/2 inch wrench to attach fuel line assembly (1) to fuel filter (2). Then attach fuel line assembly to engine fuel pump. Use a 1/2 inch wrench to hole fuel line assembly and a 9/16 inch wrench to turn swivel fitting on engine fuel pump.	
12. Cap	Install fuel tank cap.	



Location/Item	Action	Remarks
13. Pipe plug	Use 7/16 inch wrench to install pipe plug. Use Loctite on threads.	

4-15. FUEL LINE

This task covers:

a. Removal

b. Installation

INITIAL SETUP

Test Equipment

None

Tools

Tool kit, general mechanics automotive, NSN 5180-00-177-7033

Wrench, 1/2 inch

Wrench, 9/16 inch

Drain pan

Materials/Parts

Fuel line assembly (Appendix C, item 12, fig. 2)

References

None

Troubleshooting References

None

Equipment Condition

Fuel filter shutoff valve turned to OFF, shutoff switch off.

Special Environmental Conditions

Well-ventilated area required when gasoline is handled.

General Safety Instructions

WARNING

- **Allow engine to cool before performing any maintenance.**
- **Perform maintenance outdoors or in a well-ventilated area to avoid illness caused by inhalation of fuel fumes.**

FUEL TANK (CONT)

Location/Item | Action | Remarks

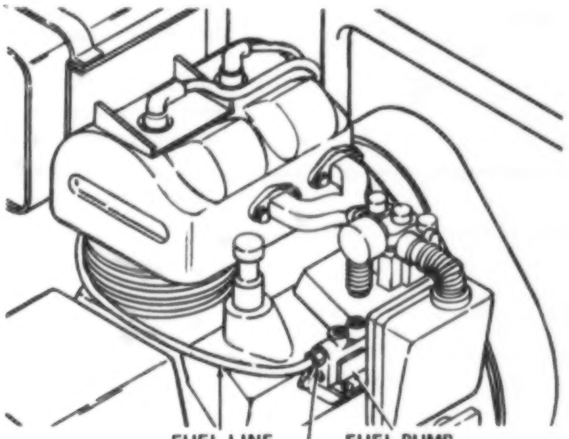
REMOVAL

WARNING

Severe burns, illness, or death can result from improper handling of gasoline. When working with gasoline:

- **Do not inhale vapors.**
- **Work in well-ventilated area.**
- **Do not work near open flame, sparks, or excessive heat.**

Location/Item	Action	Remarks
1. Drain line	Drain contents of fuel line into drain pan. Use 1/2 inch and 9/16 inch wrenches to remove fuel line from fitting on engine fuel pump.	
2. Remove line	Use 1/2 inch wrench to remove fuel line from fuel filter.	



INSTALLATION

3. Install line	Use 1/2 inch wrench to install fuel line to fuel filter.	
4. Attach line to engine	Use 1/2 inch and 9/16 inch wrenches to install fuel line to fitting on engine fuel pump.	

4-16. FRAME ASSEMBLY

This task covers:

a. Disassembly

b. Inspection

c. Cleaning

d. Assembly

INITIAL SETUP

Test Equipment

None

Tools

Tool kit, general mechanics automotive, NSN 5180-00-177-7033

- Screwdriver, phillips, cross
- Pliers, long, round nose
- Wrench, 1/2 inch, or
- Socket, 1/2 inch, and handle
- Wrench, 9/16 inch, or
- Socket, 9/16 inch, and handle

Shop equipment, automotive maintenance and repair, NSN 4910-00-754-0654

- Torque wrench, 0-175 ft lb (0-250 N·m)

Materials/Parts

Draw bar (Appendix C, item 1, fig. 3)

Engine guard (Appendix C, item 3, fig. 3)

Frame assembly (Appendix C, item 18, fig. 3)

U-Bolt (Appendix C, item 16, fig. 3)

Axle (Appendix C, item 17, fig. 3)

Engine mount (Appendix C, item 7, fig. 3)

Loctite (Item 7, Appendix D)

Cleaning solvent, P-D-680

References

None

Troubleshooting References

None

Equipment Condition

Gear reducer, pump, and wheel assemblies removed for access to frame assembly.

Special Environmental Conditions

Well-ventilated area required when solvent is used.

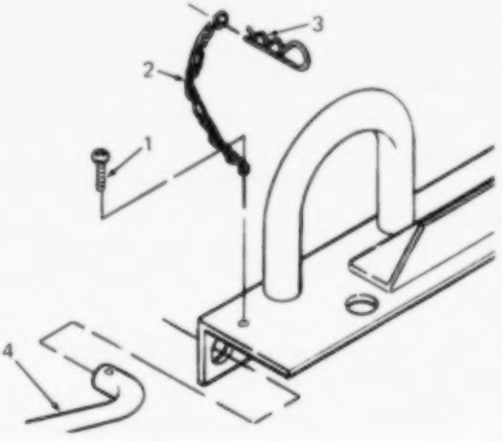
General Safety Instructions

None

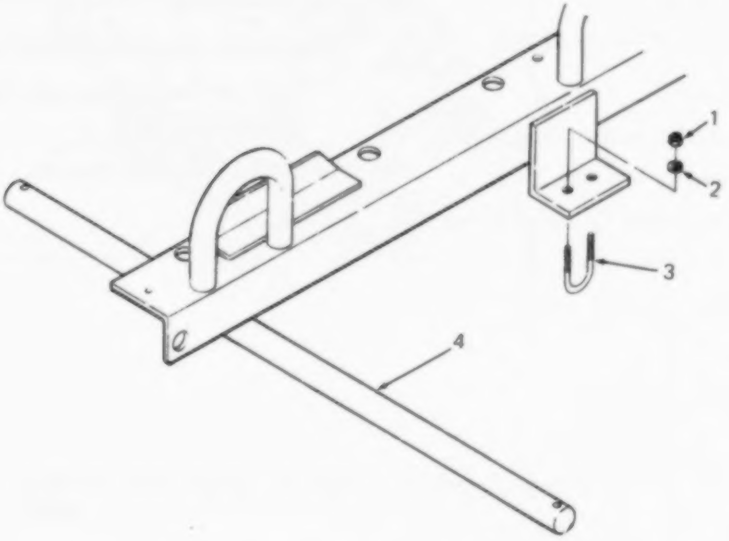
FRAME ASSEMBLY (CONT)

DISASSEMBLY

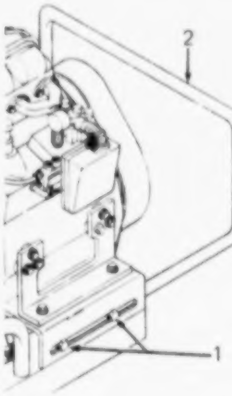
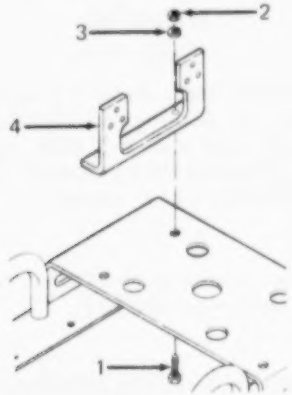
Location/Item	Action	Remarks
1. Draw bar	Pull hitch pins (3) from each side of draw bar (4). Pull draw bar in and away from frame.	
2. Hitch pins	Use cross point screwdriver to remove screw (1).	



Location/Item	Action	Remarks
3. Chain	Use pliers to separate the chain (2) and hitch pin (3).	
4. Axle	Use 1/2 inch wrench to remove nuts (1) from U-bolts (3). Remove lockwashers (2). Axle (4) can be removed by loosening nuts (1) on U-bolts (3).	



FRAME ASSEMBLY (CONT)

Location/Item	Action	Remarks
5. Engine guard	Use a 9/16 inch wrench to remove 4 cap screws (1). Pull engine guard (2) away from frame.	
6. Engine mount	Use a 9/16 inch wrench to hold cap screws (1) while removing nuts (2) with a 9/16 inch socket and handle. Remove cap screw (1), nut (2), lockwater (3), and engine mount (4). 	
INSPECTION		
7. Frame	Inspect frame for warpage. Notify direct support maintenance if warpage affects performance. Inspect frame for cracks or other damage. Notify direct support maintenance if damage or cracks are evident.	
8. Draw bar, engine guard, and engine mounts	Inspect for cracks and warpage. Replace if damaged.	

FRAME ASSEMBLY (CONT)

Location/Item	Action	Remarks
9. Hitch pins	Inspect hitch pins for cracks and spring tension. If pins are cracked or if they have no spring tension, replace them.	
10. Chains	Inspect for cracked or damaged links. Replace the chain if cracked or if damage affects the connecting of the chain to the hitch pin or screw.	
11. Axle	Inspect for distortion or damage to the cotter pin holes. Notify direct support maintenance if distortion or damage is evident.	
12. U-bolts	Inspect for thread damage. Replace damaged U-bolts.	

CLEANING

WARNING

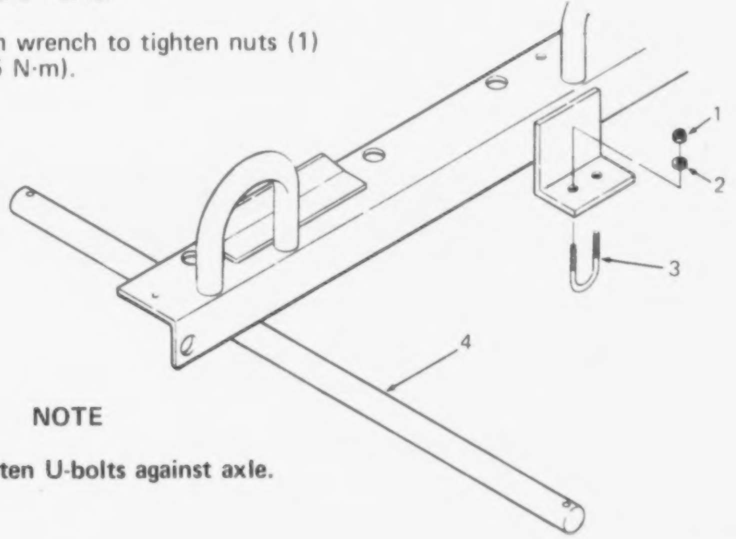
Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

Location/Item	Action	Remarks
13. Hitch pins, chains, and U-bolts	Immerse hitch pins and chains in cleaning solvent, P-D-680. After cleaning, wipe dry.	
14. Frame, axle, draw bar, engine guard, and engine mounts	Clean frame and axle with dry cleaning solvent, P-D-680. Use a stiff-bristle brush to remove caked dirt.	

FRAME ASSEMBLY (CONT)

ASSEMBLY

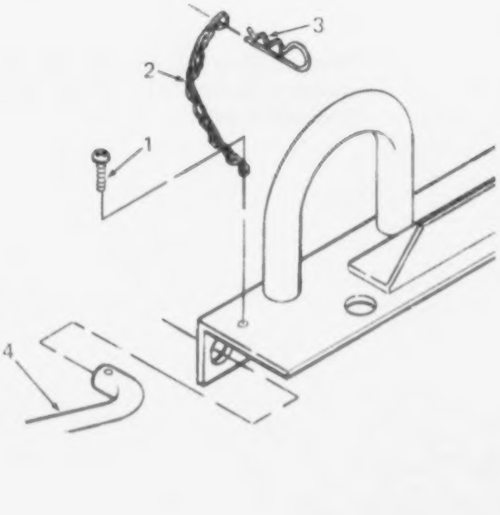
Location/Item	Action	Remarks
15. Axle	Set axle (4) against frame and hold in place with U-bolts (3). Install lockwashers (2) and nuts (1). Use Loctite on threads.	
16. Align axle	Slide axle (4) in U-bolts (3) until each end of the axle is equal distance from the frame.	
17. Nuts	Use 1/2 inch wrench to tighten nuts (1) to 4 ft lb (5 N·m).	



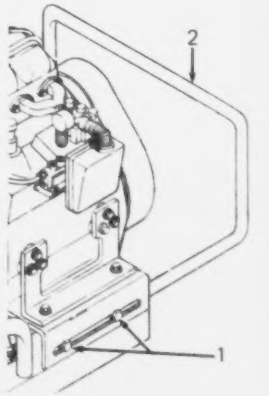
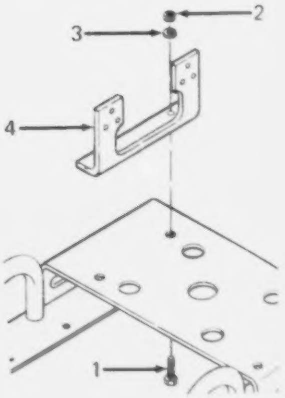
NOTE

Do not tighten U-bolts against axle.

Location/Item	Action	Remarks
18. Chains	Install hitch pin (3) on chain (2).	
19. Screws	Insert screw (1) through the last link in chain (2). Use cross point screwdriver to install screw (1) into frame. Use Loctite on threads.	
20. Draw bar	Insert draw bar (4) ends into frame. Install hitch pins (3) into each end of draw bar.	



FRAME ASSEMBLY (CONT)

Location/Item	Action	Remarks
21. Engine guard	Install cap screws (1) and use a 9/16 inch socket with a torque wrench to tighten cap screws (1) to 30 ft lb (40 N·m). Coat threads with Loctite and install cap screws (1).	
22. Engine mount	Use a 9/16 inch wrench to hold cap screws (1). Install lockwashers (3) and nuts (2). Use a 9/16 inch socket with a torque wrench to tighten nuts (2) to 30 ft lb (40 N·m).	

NOTE

When engine mounts (4) are replaced, the engine must be aligned with the coupling halves. The proper alignment is when both coupling halves slide together freely.

4-17. WHEEL ASSEMBLY

This task covers:

a. Removal

b. Disassembly

c. Inspection

d. Cleaning

e. Assembly

f. Installation

INITIAL SETUP

Test Equipment

None

Tools

Tool kit, general mechanics automotive, NSN 5180-00-177-7033

Tire iron

Pliers, long, round nose

Materials/Parts

Cotter pin (Appendix C, item 8, fig. 3)

Wheel assembly (Appendix C, item 10, fig. 3)

Cleaning solvent, P-D-680

References

None

Troubleshooting References

None

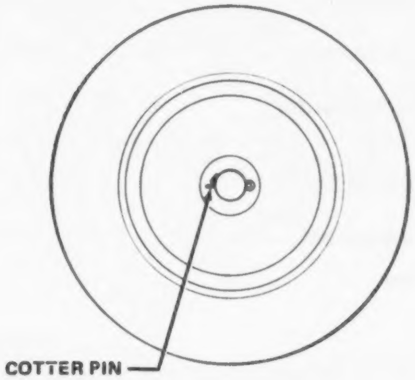
Special Environmental Conditions

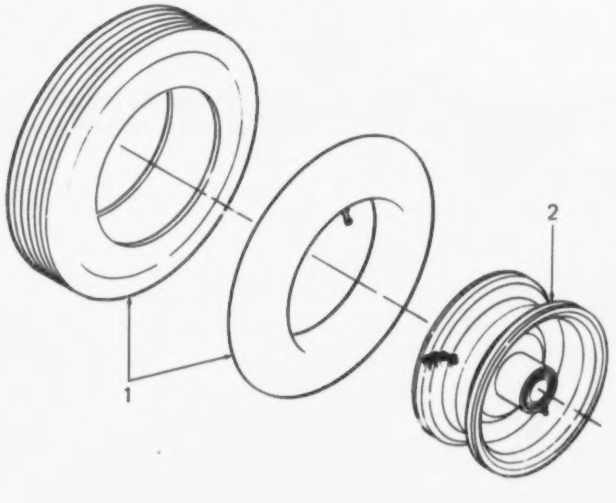
Well-ventilated area required when solvent is used.

General Safety Instructions

None

WHEEL ASSEMBLY (CONT)

Location/Item	Action	Remarks
REMOVAL		
1. Cotter pin	Use pliers to remove cotter pin. Discard cotter pin.	
2. Wheel assembly	Remove flat washer to remove each wheel assembly.	
DISASSEMBLY		
3. Tire and tube	Use tire iron or other tool to pry the sealing surface of the deflated tire out over the hub assembly (2). Remove tire and tube (1).	



WHEEL ASSEMBLY (CONT)

Location/Item	Action	Remarks
INSPECTION		
4. Tire	Inspect tires for cuts, punctures, worn threads, imbedded stones, and severe abrasions. Inspect inside of tires for broken cords and punctured walls. Replace tires which are damaged beyond repair or excessively worn.	
5. Tube	Check inner tube for leaks by inflating and immersing it in water. Any sign of bubbles indicates a leak. Patch leaks. Check the tube for dry rot and other signs of deterioration. Replace nonserviceable tubes.	
6. Hub assembly	Inspect the hub assembly for cracks, distortion, burrs on the sealing rim, and other damage. Remove all burrs with file or fine stone. Replace damaged hub assemblies. Inspect bearings for rough, scored, or brinelled rollers, scored races, and bent cages. Replace hub assembly if bearing is damaged.	

CLEANING

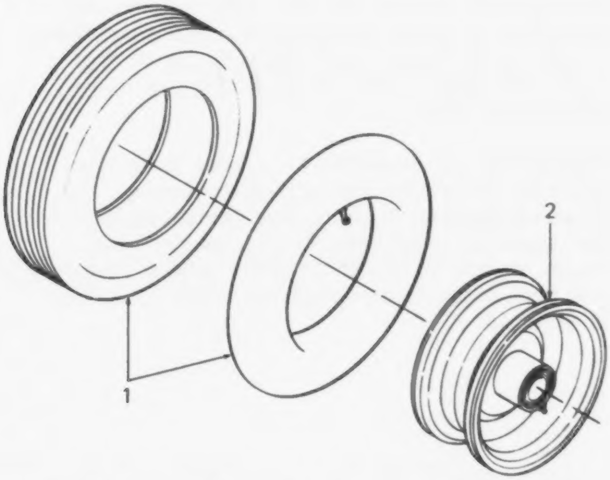
WARNING

Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

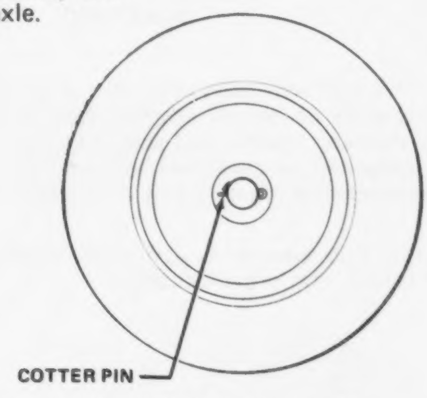
Location/Item	Action	Remarks
7. Hub assemblies	Clean hub assemblies with cleaning solvent, P-D-680, and dry thoroughly.	

WHEEL ASSEMBLY (CONT)

Location/Item	Action	Remarks
ASSEMBLY		
8. Tire and tube	Install tire on hub assembly and install inner tube. Be certain valve stem extends in the right direction and through hole in hub (5). Use tire iron to pry outer surface of tire over the hub rim. Inflate to 30 psi (207 kPa).	



INSTALLATION		
9. Wheel assembly	Install wheel assembly and flat washer on axle.	



10. Cotter pin	Insert a new cotter pin through hole in axle. Use pliers to bend one leg of the cotter pin along the contour of the axle.	
11. Grease fittings	Lubricate wheels in accordance with lubrication order LO 5-4320-275-12.	

4-18. DATA PLATES

This task covers:

a. Inspection
b. Cleaning
c. Removal
d. Replacement

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair, NSN 4910-00-754-0654

- Rivet kit
- Hammer, hand
- Alpha-numeric die set
- Drill, electric
- Drill, twist, 1/8 inch

Materials/Parts

Rivet (Appendix C, item 1, fig. 4)
Serial plate (Appendix C, item 3, fig. 4)
Operating plate (Appendix C, item 4, fig. 4)
Cleaning solvent, P-D-680

References

None

Troubleshooting References

None

Special Environmental Conditions

Well-ventilated area required when solvent is used.

General Safety Instructions

None

DATA PLATES (CONT)

Location/Item	Action	Remarks
INSPECTION		
1. Data plates	Inspect for legibility. If illegible, replace data plate.	
CLEANING		
	WARNING **Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).**	
2. Data plates	Wipe data plates with a soft cloth moistened with dry cleaning solvent, P-D-680. Wipe dry.	
REMOVAL		
3. Date plates	Use an electric drill with a 1/8 inch twist drill to remove rivets holding data plate.	
REPLACEMENT		
4. Identification plate	Use blank serial plate for replacement of the identification plate. Use hammer and die set to stamp serial plate with information applicable to each identification plate for each pump assembly.	
	NOTE **Where information on the identification plate is illegible, leave the block blank on the serial plate.**	
5. Data plates	Use a rivet kit to install data plates on coupling guard.	

4-19. ACCUMULATOR

This task covers:

a. Removal

b. Inspection

c. Cleaning

d. Assembly

e. Installation

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair, NSN 4910-00-754-0654

- Socket, 3/4 inch, and handle
- Wrench, 1-1/4 inch
- Wrench, pipe, adj jaw style, 4 inch ips
- Torque wrench, 0-175 ft lb (0-250 N·m)

Materials/Parts

- Pipe plug (Appendix C, item 1, fig. 6)
- Accumulator (Appendix C, item 5, fig. 6)
- Gasket (Appendix C, item 6, fig. 6)
- Nipple (Appendix C, item 2, fig. 6)
- Seal plate (Appendix C, item 7, fig. 6)
- Check valve assembly (Appendix C, item 8, fig. 6)
- Cleaning solvent, P-D-680
- Loctite (Item 7, Appendix D)

Personnel Required: 2

Mechanic will assist in lifting accumulator.

References

None

Troubleshooting References

- Malfunction 3, step 2
- Malfunction 4, step 1
- Malfunction 4, step 2

Special Environmental Conditions

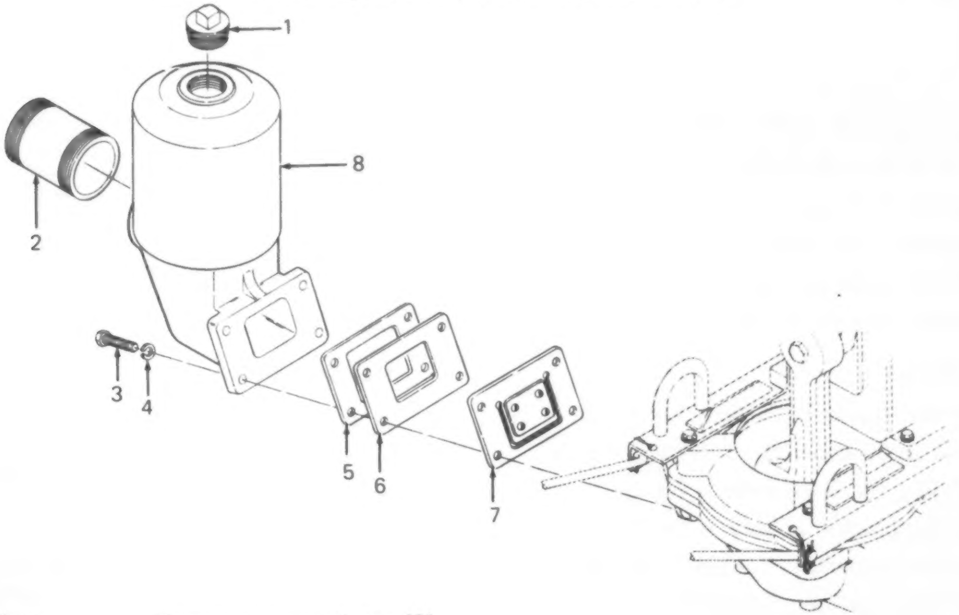
Well-ventilated area required when solvent is used.

General Safety Instructions

None

ACCUMULATOR (CONT)

Location/Item	Action	Remarks
REMOVAL		
1. Pipe plug	Use 1-1/4 inch wrench to remove pipe plug (1) from accumulator.	
2. Nipple	Use pipe wrench to remove nipple (2).	
3. Cap screws	Use 3/4 inch socket and handle to remove four cap screws (3) holding accumulator (8) on pump bowl. Remove cap screws (3) and lockwashers (4).	



Location/Item	Action	Remarks
4. Accumulator	Remove accumulator (8).	

NOTE

Gasket (5), seal plate (6), and check valve assembly (7) may stick to accumulator.

Remove and discard gasket (5). Remove seal plate (6), and check valve assembly (7) from accumulator.

ACCUMULATOR (CONT)

Location/Item	Action	Remarks

INSPECTION

5. Accumulator	Inspect accumulator for thread damage and warpage. Replace if damaged or warped.	
6. Pipe plug	Inspect for damaged threads. Replace if damaged.	
7. Nipple	Inspect for damaged threads and cracks. Replace if damaged or cracked.	
8. Seal plate and check valve assembly	Inspect for cracks and warpage. Replace if damaged or warped.	

CLEANING

WARNING

Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

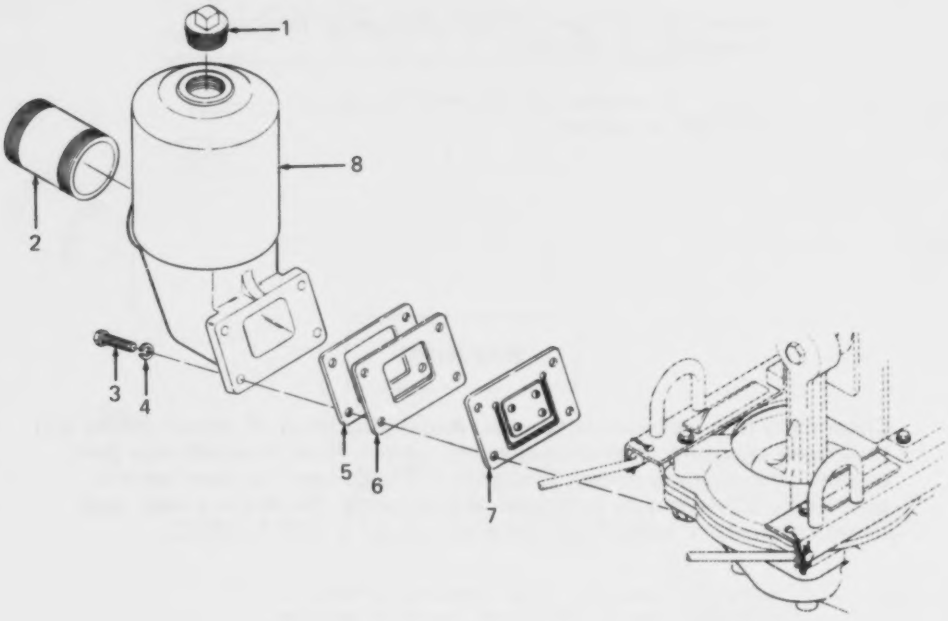
9. Accumulator, nipple, seal plate, and check valve assembly	Clean accumulator with cleaning solvent, P-D-680. Use a stiff-bristle brush to remove caked dirt.	
10. Pipe plug	Clean pipe plug with cleaning solvent, P-D-680.	

INSTALLATION

11. Accumulator	Place four cap screws (3) with lockwashers (4) through screw holes in accumulator (8). Install gasket (5) and seal plate (6) on cap screws (3). Install check valve assembly (7) on cap screws (3). Use Loctite on screw threads.	

ACCUMULATOR (CONT)

Location/Item	Action	Remarks
12. Cap screws	Align cap screws with accumulator, gasket, and check valve assembly to threaded screw holes in pump bowl. Use 3/4 inch socket with a torque wrench to tighten the four cap screws to a torque of 40 ft lb (54 N·m).	
13. Nipple	Use Loctite on nipple threads. Use pipe wrench to install nipple (2).	
14. Pipe plug	Use Loctite on pipe plug threads. Use 1-1/4 inch wrench to install pipe plug (1).	



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4-20. DISCHARGE PORT

This task covers:

a. Removal

b. Inspection

c. Cleaning

d. Installation

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair, NSN 4910-00-754-0654

Socket, 3/4 inch, and handle

Wrench, pipe, adj jaw style, 4 inch ips

Torque wrench 0-175 ft lb (0-250 N·m)

Materials/Parts

Nipple (Appendix C, item 2, fig. 6)

Gasket (Appendix C, item 6, fig. 6)

Seal plate (Appendix C, item 7, fig. 6)

Check valve assembly (Appendix C, item 8, fig. 6)

Discharge port (Appendix C, item 9, fig. 6)

Cleaning solvent, P-D-680

Loctite (Item 7, Appendix D)

References

None

Troubleshooting References

None

Special Environmental Conditions

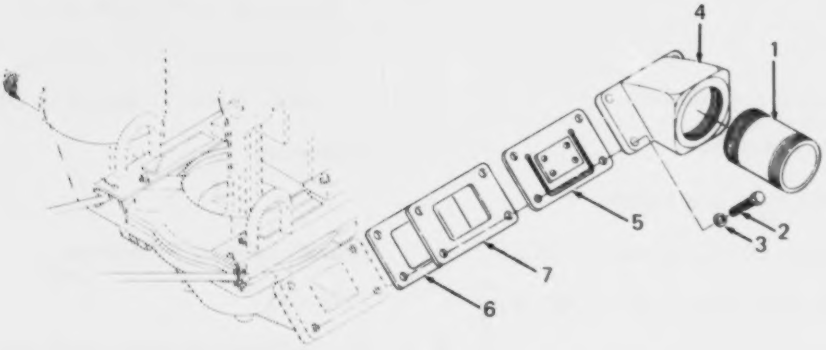
Well-ventilated area required when solvent is used.

General Safety Instructions

None

DISCHARGE PORT (CONT)

Location/Item	Action	Remarks
REMOVAL		
1. Nipple	Use pipe wrench to remove nipple (1) from discharge port (4).	
2. Screws	Use 3/4 inch socket and handle to remove four cap screws (2) holding discharge port (4) on pump bowl. Remove cap screws (2) and lockwashers (3).	



Location/Item	Action	Remarks
3. Discharge port	Remove discharge port (4).	

NOTE

Gasket (6), seal plate (7), and check valve assembly (5) may stick to the discharge port.

Location/Item	Action	Remarks
	Remove and discard gasket (6). Remove seal plate (7), and check valve assembly (5) from discharge port.	
INSPECTION		
4. Discharge port	Inspect discharge port for thread damage and warpage. Replace if damaged or warped.	
5. Seal plate and check valve assembly	Inspect for cracks or warpage. Replace if damaged.	
6. Nipple	Inspect for damaged threads and cracks. Replace if damaged or cracked.	

DISCHARGE PORT (CONT)

Location/Item	Action	Remarks

CLEANING

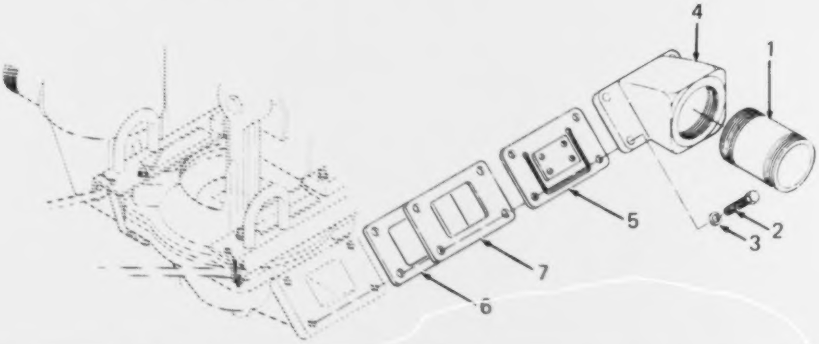
WARNING

Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

7. Discharge port, nipple, seal plate, and check valve assembly	Clean with cleaning solvent, P-D-680. Use a stiff-bristle brush to remove caked dirt.	

INSTALLATION

8. Discharge port	Place four cap screws (2) with lockwashers (3) through screw holes in discharge port (4). Install check valve assembly (5), seal plate (7), and gasket (6) on cap screws (2). Use Loctite on screw threads.	
9. Cap screws	Align cap screws with discharge port, gasket, seal plate, and check valve assembly to threaded screw holes in pump bowl. Use 3/4 inch socket with torque wrench to tighten the four cap screws to a torque of 40 ft lb (54 N·m).	
10. Nipple	Use Loctite on nipple threads. Use pipe wrench to install nipple (1).	



4-21. DIAPHRAGM

This task covers:

a. Removal
b. Inspection
c. Cleaning
d. Installation

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair, NSN 4910-00-754-0654

Socket, 15/16 inch, and handle

Socket, 3/4 inch, and handle

Torque wrench, 0-175 ft lb (0-250 N·m)

Materials/Parts

Diaphragm (Appendix C, item 6, fig. 7)

Loctite (Item 7, Appendix D)

Cleaning solvent, P-D-680

Personnel Required: 2

Mechanic will assist in lifting pump assembly.

References

None

Troubleshooting References

None

Equipment Condition

Drain plug removed from pump bowl to remove fluid from pump.

Special Environmental Conditions

Well-ventilated area required when solvent is used.

General Safety Instructions

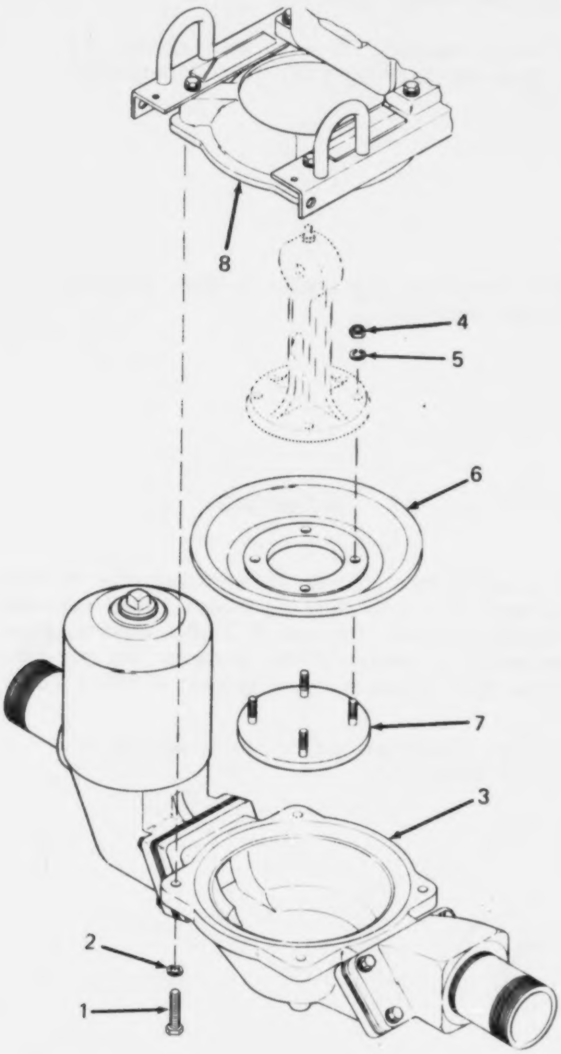
None

DIAPHRAGM (CONT)

Location/Item	Action	Remarks

REMOVAL

1. Pump bowl assembly	Use 15/16 inch socket and handle to remove four cap screws (1) and lockwashers (2) holding pump bowl assembly (3) to diaphragm clamp (8).	

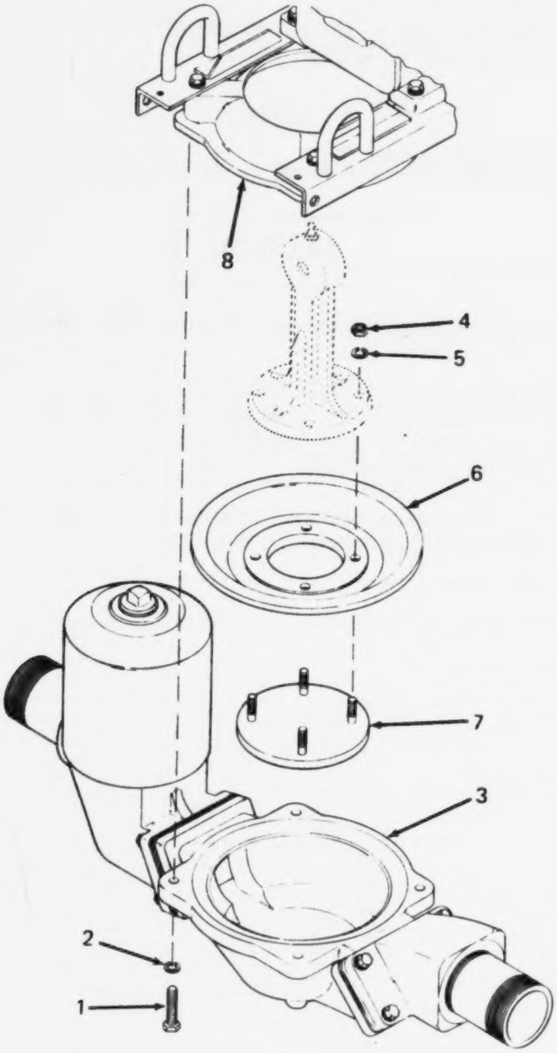


DIAPHRAGM (CONT)

Location/Item	Action	Remarks
	NOTE **Use draw bar to lift pump assembly up and away from pump bowl assembly (3). The pump assembly will pivot on its wheels to aid in lifting.**	
2. Nuts	To break seal, pull diaphragm (6) away from lip of diaphragm clamp (8). Use 3/4 inch socket and handle to loosen four nuts (4). Remove nuts (4) and lockwashers (5).	
3. Diaphragm	Pull clamp assembly (7) away from connecting rod. Separate diaphragm (6) from clamp assembly (7).	
INSPECTION		
4. Diaphragm	Inspect diaphragm for cracks or tears. Replace damaged diaphragm.	
CLEANING		
	WARNING **Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).**	
5. Diaphragm	Clean the diaphragm with cleaning solvent, P-D-680. Wipe dry.	

DIAPHRAGM (CONT)

Location/Item	Action	Remarks
INSTALLATION		
6. Diaphragm	Install diaphragm (6) over studs on clamp assembly (7).	



DIAPHRAGM (CONT)

Location/Item	Action	Remarks
7. Clamp assembly	Install clamp assembly (7) with diaphragm (6) on connecting rod.	
8. Nuts	Use Loctite on threads of studs. Install lockwashers (5) and nuts (4). Use 3/4 inch socket with a torque wrench to tighten nuts (4) to 40 ft lb (54 N·m).	
9. Pump bowl assembly	Use the draw bar to lift pump assembly over pump bowl assembly (3).	

NOTE

The pump assembly will pivot on its wheels to aid in lifting.

CAUTION

Be certain diaphragm is seated on pump bowl assembly seat.

Location/Item	Action	Remarks
	Align screw holes of pump bowl assembly (3) with threaded holes in diaphragm clamp (8). Install cap screws (1) and lockwashers (2). Use Loctite on screw threads.	
10. Cap screws	Use 15/16 inch socket with torque wrench to tighten cap screws (1) to 75 ft lb (102 N·m).	

4-22. CLAMP ASSEMBLY

This task covers:

a. Disassembly

b. Inspection

c. Cleaning

d. Assembly

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair, NSN 4910-00-754-0654

Stud removing and installing tool, 1/2 inch

Materials/Parts

Stud (Appendix C, item 8, fig. 7)

Connecting rod clamp (Appendix C, item 9, fig. 7)

Loctite (Item 7, Appendix D)

Cleaning solvent, P-D-680

References

None

Troubleshooting References

None

Equipment Condition

Pump bowl assembly and diaphragm removed for access to clamp assembly.

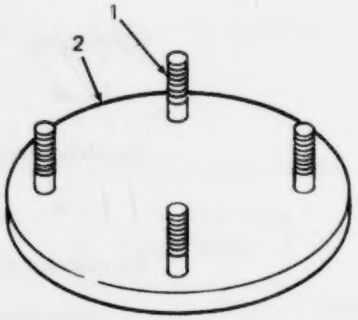
Special Environmental Conditions

Well-ventilated area required when solvent is used.

General Safety Instructions

None

CLAMP ASSEMBLY (CONT)

Location/Item	Action	Remarks
DISASSEMBLY		
1. Studs	Use 1/2 inch stud removing and installing tool to remove studs (1) from connecting rod clamp (2).  	
INSPECTION		
2. Threads	Inspect threads on studs (1) and threads in connecting rod clamp (2) for damage. Replace damaged parts.	
3. Connecting rod clamp	Inspect connecting rod clamp (2) for cracks or warpage. Replace if damaged.	
CLEANING		

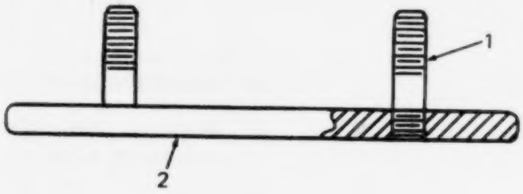
WARNING

Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

4. Studs and connecting rod clamp	Clean studs and connecting rod clamp with cleaning solvent, P-D-680. Use a stiff-bristle brush to remove caked dirt.	

CLAMP ASSEMBLY (CONT)

Location/Item	Action	Remarks
ASSEMBLY		
5. Studs	Use Loctite on stud threads. Use 1/2 inch stud removing and installing tool to install studs (1) into connecting rod clamp (2). Tighten studs until they are flush with bottom of connecting rod clamp.	



4-23. PUMP BOWL

This task covers:

a. Removal of pump bowl from diaphragm clamp.

b. Disassembly

c. Inspection

d. Cleaning

e. Assembly

f. Installation of pump bowl on diaphragm clamp.

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive
maintenance and repair,
NSN 4910-00-754-0654

Socket, 15/16 inch, and handle

Wrench, 5/8 inch

Torque wrench, 0-175 ft lb (0-250 N·m)

Materials/Parts

Drain plug (Appendix C, item 3, fig. 7)

Pump bowl (Appendix C, item 10, fig. 7)

Loctite (Item 7, Appendix D)

Cleaning solvent, P-D-680

Personnel Required: 2

Mechanic will assist in lifting pump assembly and pump bowl.

References

None

Troubleshooting References

None

Equipment Condition

Accumulator, discharge port, gaskets, seal plates, and valve assemblies removed for access to pump bowl.

Special Environmental Conditions

Well-ventilated area required when solvent is used.

General Safety Instructions

None

PUMP BOWL (CONT)

Location/Item	Action	Remarks

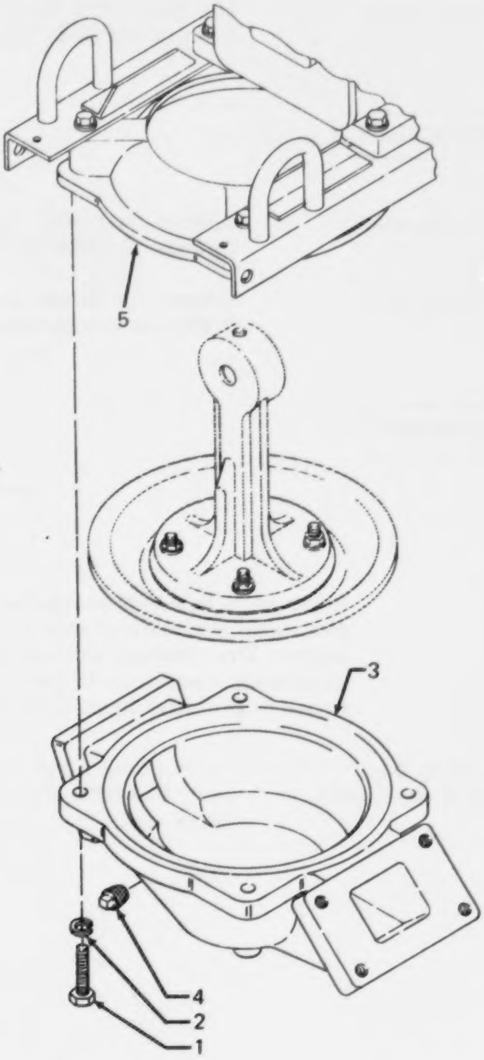
REMOVAL

1. Pump bowl

Use 15/16 inch socket and handle to remove four cap screws (1) and lockwashers (2) holding pump bowl (3) to diaphragm clamp (5).

NOTE

Use the draw bar to lift pump assembly up and away from pump bowl. The pump assembly will pivot on its wheels to aid in lifting.



PUMP BOWL (CONT)

Location/Item	Action	Remarks
DISASSEMBLY		
2. Drain plug	Use 5/8 inch wrench to remove drain plug (4) from pump bowl (3).	
INSPECTION		
3. Pump bowl	Inspect for cracks, warpage, and damaged threads. Replace pump bowl if damaged.	
4. Drain plug	Inspect for thread damage. Replace drain plug if threads are damaged.	
CLEANING		

WARNING

Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

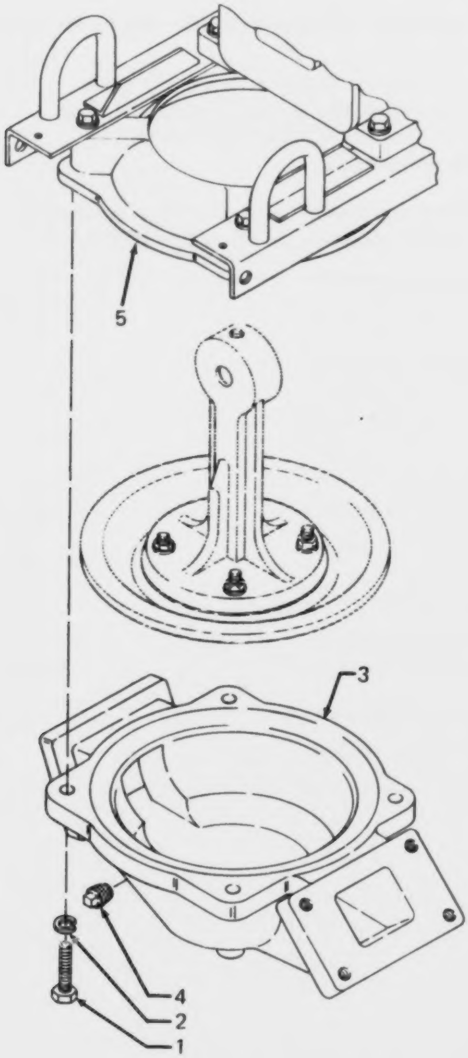
Location/Item	Action	Remarks
5. Pump bowl and drain plug	Clean pump bowl and drain plug with cleaning solvent, P-D-680. Use a stiff-bristle brush to remove caked dirt.	

PUMP BOWL (CONT)

Location/Item	Action	Remarks

ASSEMBLY

6. Drain plug	Use Loctite on drain plug threads. Use 5/8 inch wrench to install drain plug (4) on pump bowl (3). Tighten until plug is snug.	



PUMP BOWL (CONT)

Location/Item	Action	Remarks
INSTALLATION		
7. Pump bowl	Use the draw bar to lift pump assembly over pump bowl (3). **NOTE** **The pump assembly will pivot on its wheels to aid in lifting.** Align screw holes of pump bowl (3) with threaded holes in diaphragm clamp (5). Use Loctite on threads. Install cap screws (1) and lockwashers (2).	
8. Cap screws	Use 15/16 inch socket with a torque wrench to tighten cap screws (1) to 75 ft lb (102 N·m).	

4-24. CONNECTING ROD ASSEMBLY

This task covers:

a. Removal

b. Disassembly

c Inspection

d. Cleaning

e. Assembly

f. Installation

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair, NSN 4910-00-754-0654

Wrench, 9/16 inch

Wrench, 1-1/8 inch, or

Socket, 1-1/8 inch and handle

Socket, 3/4 inch and handle

Wrench, 15/16 inch, or

Socket, 15/16 inch and handle

Torque wrench, 0-175 ft lb (0-250 N·m)

Materials/Parts

Shoulder bolt (Appendix C, item 3, fig. 8)

Connecting rod assembly (Appendix C, item 4, fig. 8)

Crank (Appendix C, item 12, fig. 8)

Loctite (Item 7, Appendix D)

Cleaning solvent, P-D-680

References

None

Troubleshooting References

None

Special Environmental Conditions

Well-ventilated area required when solvent is used.

General Safety Instructions

None

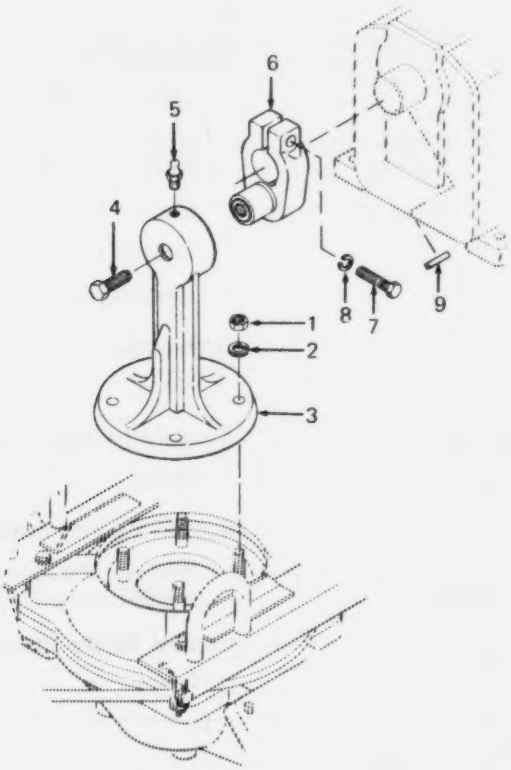
CONNECTING ROD ASSEMBLY (CONT)

REMOVAL

NOTE

Position connecting rod to the down position.

Location/Item	Action	Remarks
1. Nuts	Use 3/4 inch socket and handle to remove nuts (1). Remove lockwashers (2).	



Location/Item	Action	Remarks
2. Connecting rod assembly	Use 1-1/8 inch socket and handle to remove shoulder bolt (4). Hand crank the engine until connecting rod (3) is clear of the studs protruding through the diaphragm. Slide the connecting rod assembly off crank (6).	
3. Crank	Use 15/16 inch socket and handle to remove cap screw (7). Remove lockwasher (8). Slide crank (6) off gear reducer shaft. Remove square key (9).	

CONNECTING ROD ASSEMBLY (CONT)

Location/Item	Action	Remarks
DISASSEMBLY		
4. Grease fitting	Use 9/16 inch wrench to remove grease fitting (5).	
INSPECTION		
5. Shoulder bolt	Inspect for damaged threads. Replace if damaged.	
6. Connecting rod	Inspect for cracks, damaged threads in grease fitting hole, galled bearing bore, and warpage. Replace if any damaged is evident.	
7. Crank	Inspect for cracks, damaged threads in grease fitting hole, damaged bearing, and warpage. Replace if any damage is evident.	
CLEANING		

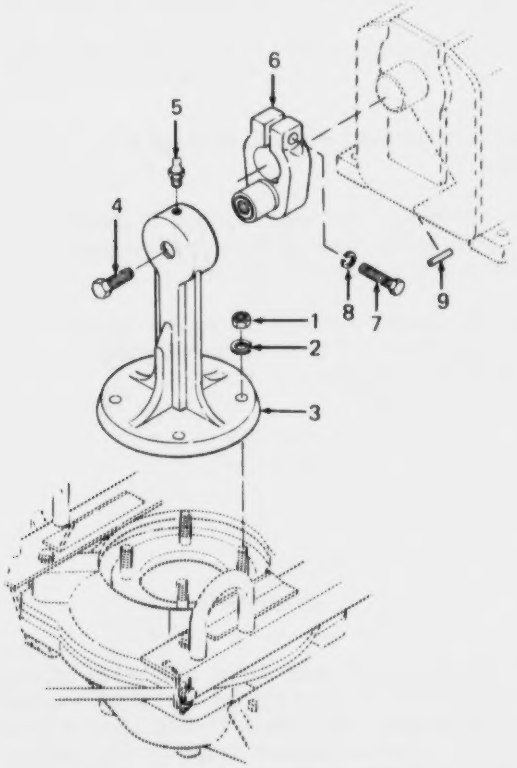
WARNING

Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

8. Shoulder bolt and grease fitting	Clean with dry cleaning solvent, P-D-680. Wipe dry.	
9. Connecting rod	Clean with dry cleaning solvent, P-D-680. Use a stiff-bristle brush to remove caked dirt. Use a soft-bristle brush to remove old grease from bearing. Wipe dry. Coat the bearing with light oil.	

CONNECTING ROD ASSEMBLY (CONT)

Location/Item	Action	Remarks
10. Crank	Wash in dry cleaning solvent, P-D-680. Use a soft-bristle brush to remove old grease. After cleaning, wipe the bore and journal surfaces with light oil and wrap in lint-free paper until ready to assemble on speed reducer and connecting rod.	



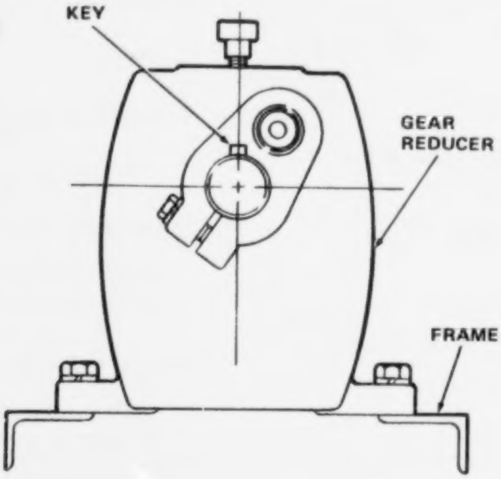
Location/Item	Action	Remarks
11. Grease fitting	Use 9/16 inch wrench to install grease fitting (5).	

INSTALLATION

Location/Item	Action	Remarks
12. Crank	Install square key (9) into keyway in gear reducer shaft. Align keyway of crank (6) with square key (9). Slide crank over square key and onto gear reducer shaft.	

CONNECTING ROD ASSEMBLY (CONT)

Location/Item	Action	Remarks
13. Cap screw and lockwasher	Use Loctite on cap screw threads. Install lockwasher (8) and cap screw (7) on crank. Do not tighten until connecting rod assembly has been installed.	
14. Connecting rod assembly	Hand crank engine until square key is rotated to the 12 o-clock position. Install connecting rod assembly on the crank.	



Location/Item	Action	Remarks
15. Shoulder bolt	Use Loctite on shoulder bolt threads. Install shoulder bolt (4) through connecting rod (3) and into crank (6). Use 1-1/8 inch socket with torque wrench to tighten shoulder bolt (4) to 75 ft lb (102 N·m).	
16. Nuts	Align four holes in connecting rod (3) with studs sticking through diaphragm.	

NOTE

Hand crank the engine to lower the connecting rod to the studs.

Location/Item	Action	Remarks
	Use Loctite on stud threads. Install lockwashers (2) and nuts (1). Use 3/4 inch socket with torque wrench to tighten nuts (1) to 40 ft lb (54 N·m).	
17. Tighten cap screw	Use 15/16 inch socket with torque wrench to tighten cap screw (7) to 75 ft lb (102 N·m).	

4-25. COUPLING

This task covers:

a. Removal

b. Inspection

c. Cleaning

d. Installation

INITIAL SETUP

Test Equipment

None

Tools

Tool kit, general mechanics automotive, NSN 5180-00-177-7033

Key, hex drive, 5/32 inch

Materials/Parts

Coupling (Appendix C, item 18, fig. 8)

Spider (Appendix C, item 19, fig. 8)

Key (Appendix C, item 20, fig. 8)

Key (Appendix C, item 21, fig. 8)

Cleaning solvent, P-D-680

References

None

Troubleshooting References

None

Equipment Condition

Engine and coupling guard removed for access to coupling.

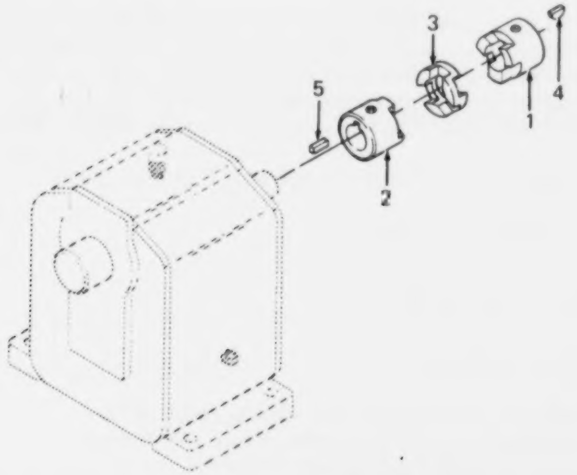
Special Environmental Conditions

Well-ventilated area required when solvent is used.

General Safety Instructions

None

COUPLING (CONT)

Location/Item	Action	Remarks
REMOVAL		
1. Setscrew	Use a 5/32 inch hex key to loosen one setscrew in each coupling half.  	
2. Coupling halves	Pull coupling half (1) from engine shaft. Remove and discard key (4). Pull coupling half (2) from gear reducer shaft. Remove key (5) from gear reducer shaft.	
3. Spider	Separate spider (3) from coupling half.	
INSPECTION		
4. Coupling halves	Inspect coupling halves for cracks in metal. Replace coupling if damaged.	
5. Spider	Inspect for cracks or tears in rubber spider. Replace spider if damaged.	

COUPLING (CONT)

CLEANING

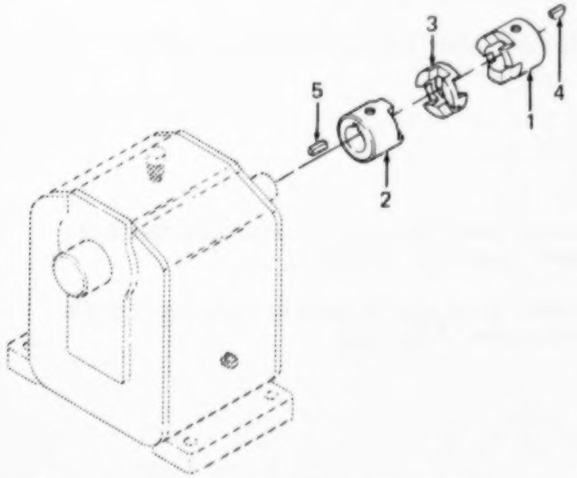
WARNING

Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

Location/Item	Action	Remarks
6. Coupling halves and spider	Clean with dry cleaning solvent, P-D-680. Wipe dry.	

INSTALLATION

Location/Item	Action	Remarks
7. Coupling halves	Install a new key (4) on engine shaft. Slide coupling half (1) on engine shaft and tighten setscrew with a 5/32 inch hex key. Install key (5) on gear reducer shaft. Slide coupling half (2) on gear reducer shaft and tighten setscrew with a 5/32 inch hex key.	



Location/Item	Action	Remarks
8. Spider	Install spider on gear reducer coupling half.	

4-26. GEAR REDUCER

This task covers:

a. Removal

b. Inspection

c. Installation

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair, NSN 4910-00-754-0654

Wrench, 15/16 inch

Socket, 15/16 inch and handle

Torque wrench, 0-175 ft lb (0-250 N·m)

Materials/Parts

Gear reducer (Appendix C, item 1, fig. 9)

Loctite (Item 7, Appendix D)

References

None

Troubleshooting References

None

Equipment Condition

Engine, coupling guard, and coupling removed for access to gear reducer.

Special Environmental Conditions

None

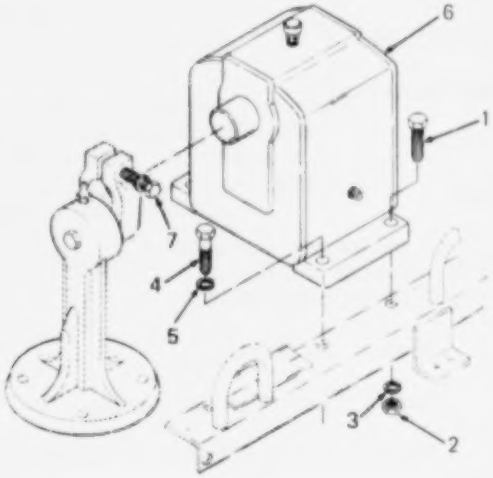
General Safety Instructions

None

GEAR REDUCER (CONT)

REMOVAL

Location/Item	Action	Remarks
1. Cap screw on crank	Use 15/16 inch socket and handle to loosen cap screw (7). Do not remove screw from crank.	



Location/Item	Action	Remarks
2. Cap screws closest to crank	Use 15/16 inch socket and handle to remove cap screws (4). Remove two cap screws (4) and lockwashers (5).	
3. Cap screws and nuts	Use 15/16 inch wrench to hold nuts (2). Use 15/16 inch socket and handle to remove cap screws (1). Remove two cap screws (1), nuts (2), and lockwashers (3).	
4. Gear reducer	Slide gear reducer (6) away from crank.	

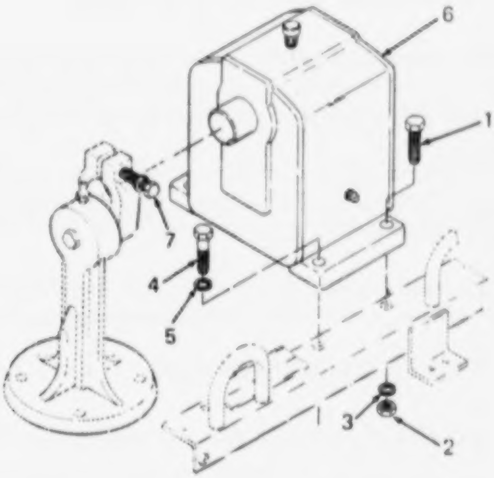
NOTE

It may be necessary to open crank to release gear reducer shaft.

INSPECTION

Location/Item	Action	Remarks
5. Shaft	Check for input and output shaft rotation. If either shaft binds or does not rotate, replace gear reducer.	

GEAR REDUCER (CONT)

Location/Item	Action	Remarks
INSTALLATION		
6. Gear reducer	Set gear reducer (6) on frame. Slide gear reducer shaft into crank. Align four screw holes in gear reducer and frame.	
7. Cap screws and nuts	Use Loctite on screw threads. Use 15/16 inch wrench to hold nuts (2). Use 15/16 inch socket and handle to install two cap screws (1). Install nuts (2) and lockwashers (3).	
	NOTE **Do not tighten.**	
8. Cap screws closest to crank	Use Loctite on screw threads. Use 15/16 inch socket and handle to install two cap screws (4). Install lockwashers (5).	
	NOTE **Do not tighten.**	
9. Tighten cap screws	Use 15/16 inch socket with a torque wrench to tighten cap screws (1, 4, and 7) to a torque of 75 ft lb (102 N·m).	

Section VII. PREPARATION FOR STORAGE OR SHIPMENT

4-27. GENERAL

This section provides instructions for preparation of the pump assembly for storage or shipment.

4-28. ADMINISTRATIVE STORAGE

a. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period appropriate maintenance records will be kept.

b. Before placing equipment in administrative storage, current maintenance services and equipment serviceable criteria (ESC) evaluations should be completed, shortcomings and deficiencies should be corrected, and all modification work orders (MWO's) should be applied.

c. Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.

4-29. PACKING AND SHIPPING

a. Use shipping plugs, closures, or sealing tape to cover all openings in the pump assembly.

b. Attach to the pump assembly all forms, tags, and records applicable to the unit.

CHAPTER 5

DIRECT SUPPORT MAINTENANCE INSTRUCTIONS

This chapter contains the following frequently used maintenance information:

a. Information on repair parts, special tools, TMDE, and support equipment.

b. Troubleshooting

c. Maintenance procedures

The Symptom Index on page 5-2 is a guide to the troubleshooting information. There is also an index to the maintenance procedures on page 5-3.

Section	Title	Page
I	Repair Parts, Special Tools, TMDE, and Support Equipment	5-1
II	Troubleshooting	5-2
III	Maintenance Procedures	5-3

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

5-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

5-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

No special tools, TMDE, or support equipment is required for this pump.

5-3. SPARES AND REPAIR PARTS

Spares and repair parts are listed and illustrated in Appendix C of this manual.

Section II. TROUBLESHOOTING

5-4. TROUBLESHOOTING

a. Table 5-1 contains troubleshooting information for locating and correcting most of the operating troubles which are the responsibility of direct support maintenance. Each malfunction for an individual component, unit, or system is followed by a list of tests or inspections which will help you to determine probable causes and corrective actions to take. Perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

c. Only those functions within the scope of direct support maintenance are listed. For troubleshooting procedures within the scope of operator/crew maintenance, refer to table 3-1. For troubleshooting procedures within the scope of organizational maintenance, refer to table 4-3.

5-5. SYMPTOM INDEX

Refer to the Symptom Index below. Locate the malfunction which is the same, or most nearly the same, as the trouble you are having with the pump assembly. The Symptom Index lists the first page of troubleshooting information for that malfunction. Follow the steps one by one, and perform the corrective actions listed.

Malfunction Number	Description	Page
1	Gear reducer input shaft will not rotate.	5-2
2	Gear reducer output shaft will not rotate.	5-2

Table 5-1. Direct Support Troubleshooting

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

1. GEAR REDUCER INPUT SHAFT WILL NOT ROTATE.

Step 1. Check for broken gear or bearing.

Disassemble gear reducer and replace broken parts in accordance with paragraph 5-11.

2. GEAR REDUCER OUTPUT SHAFT WILL NOT ROTATE.

Step 1. Check for broken gear or bearing.

Disassemble gear reducer and replace broken parts in accordance with paragraph 5-11.

Section III. MAINTENANCE PROCEDURES

INDEX

	Para		Para
Accumulator	5-9	Gear Reducer	5-11
Crank and Connecting Rod	5-10	General Instructions	5-6
Discharge Port	5-9	Pump	5-8
Frame Assembly	5-7		

5-6. GENERAL INSTRUCTIONS

Most maintenance instructions in this section will list resources required, personnel required, and equipment condition for the start of the procedure. Note the following:

- Resources required are not listed unless they apply to the procedure.
- Personnel required are listed only if the task requires more than one. If PERSONNEL is not listed, it means one person can do the task.
- The normal standard equipment condition to start a maintenance task is engine stopped and cut-off switch off. EQUIPMENT CONDITION is not listed unless some other condition is required besides the power being off.

5-7. FRAME ASSEMBLY

This task covers:

a. Straightening bent frame.

b. Aligning frame.

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair NSN 4910-00-754-0654

Materials/Parts

Frame assembly (Appendix C, item 20, fig. 3)

References

None

Troubleshooting References

None

Equipment Condition

Engine, engine guard, coupling guard, gear reducer, pump assembly, wheels, and axle removed for access to frame assembly.

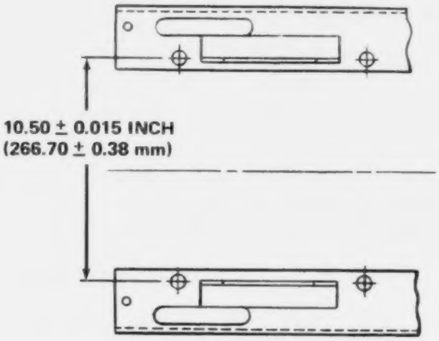
Special Environmental Conditions

None

General Safety Instructions

None

FRAME ASSEMBLY (CONT)

Location/Item	Action	Remarks
1. Straightening	Straighten distorted or bent structural members of the frame assembly.	
2. Aligning	Measure for frame assembly alignment. The mounting holes for the diaphragm clamp must measure 10.50 ±0.015 inch (266.70 ±0.38 mm) center-to-center. Align frame assembly if required.	

5-8. PUMP

This task covers:

Thread repair.

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair NSN 4910-00-754-0654

- Tap, 1/2-13 UNC-2B, and handle
- Tap, 5/8-11 UNC-2B, and handle
- Tap, 1/2 inch NPT, and handle

Materials/Parts

Diaphragm clamp (Appendix C, item 5, fig. 7)

Bowl (Appendix C, item 10, fig. 7)

Connecting rod clamp (Appendix C, item 9, fig. 7)

Personnel Required: 2

Mechanic will assist in lifting pump.

References

None

Troubleshooting References

None

Equipment Condition

Pump bowl, diaphragm clamp, and clamp removed from pump assembly.

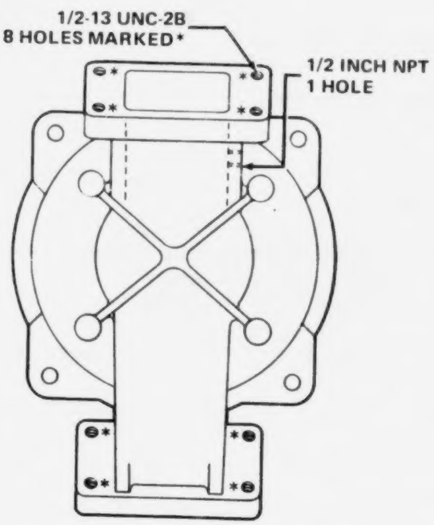
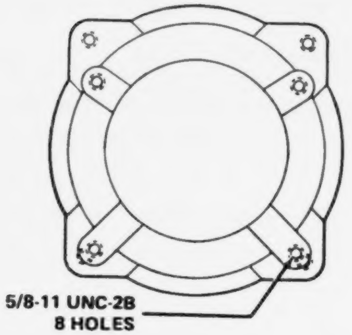
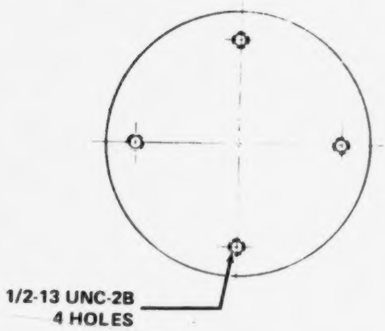
Special Environmental Conditions

None

General Safety Instructions

Compressed air for cleaning shall not exceed 30 psi (207 kPa). Use goggles or face shield to prevent eye injury from flying chips.

PUMP (CONT)

Location/Item	Action	Remarks
1. Bowl	Use 1/2-13 UNC-2B tap and handle to repair threads in holes marked *. Blow out chips with compressed air. Use 1/2 NPT tap and handle to repair threads in pipe plug hole. Blow out chips with compressed air.	 1/2-13 UNC-2B 8 HOLES MARKED* 1/2 INCH NPT 1 HOLE
2. Diaphragm clamp	Use 5/8-11 UNC-2B tap and handle to repair threads in diaphragm clamp. Blow out chips with compressed air.	 5/8-11 UNC-2B 8 HOLES
3. Connecting rod clamp	Use 1/2-13 UNC-2B tap and handle to repair threads in holes of clamp. Blow out chips with compressed air.	 1/2-13 UNC-2B 4 HOLES

5-9. ACCUMULATOR AND DISCHARGE PORT

This task covers:

Thread repair.

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive
maintenance and repair
NSN 4910-00-754-0654

Tap, 2 inch NPT, and handle

Tap, 4 inch NPT, and handle

Materials/Parts

Accumulator (Appendix C, item 5, fig. 6)

Discharge port (Appendix C, item 9, fig. 6)

Personnel Required: 2

Mechanic will assist in lifting accumulator.

References

None

Troubleshooting References

None

Equipment Condition

Accumulator and discharge port removed from pump assembly.

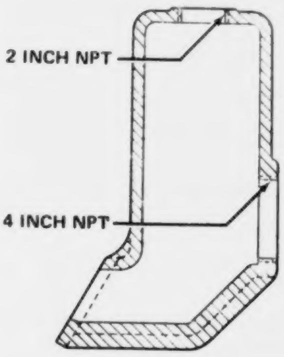
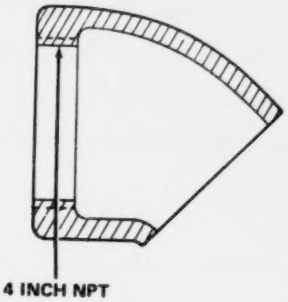
Special Environmental Conditions

None

General Safety Instructions

Compressed air for cleaning shall not exceed 30 psi (207 kPa). Use goggles or face shield to prevent eye injury from flying chips.

ACCUMULATOR AND DISCHARGE PORT (CONT)

Location/Item	Action	Remarks
1. Accumulator	Use 2 inch NPT tap and handle to repair threads in accumulator pipe plug hole. Blow out chips with compressed air. Use 4 inch NPT tap and handle to repair threads in accumulator pipe nipple hole. Blow out chips with compressed air.	
2. Discharge port	Use 4 inch NPT tap and handle to repair threads in pipe nipple hole. Blow out chips with compressed air.	

5-10. CRANK AND CONNECTING ROD

This task covers:

a. Bearing replacement.

b. Inner race replacement.

c. Thread repair.

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive
maintenance and repair
NSN 4910-00-754-0654

Puller, mechanical, gear and bearing

Tap, 5/8-11 UNC-2B, and handle

Materials/Parts

Crank (Appendix C, item 12, fig. 8)

References

None

Troubleshooting References

None

Equipment Condition

Crank removed from drive.

Special Environmental Conditions

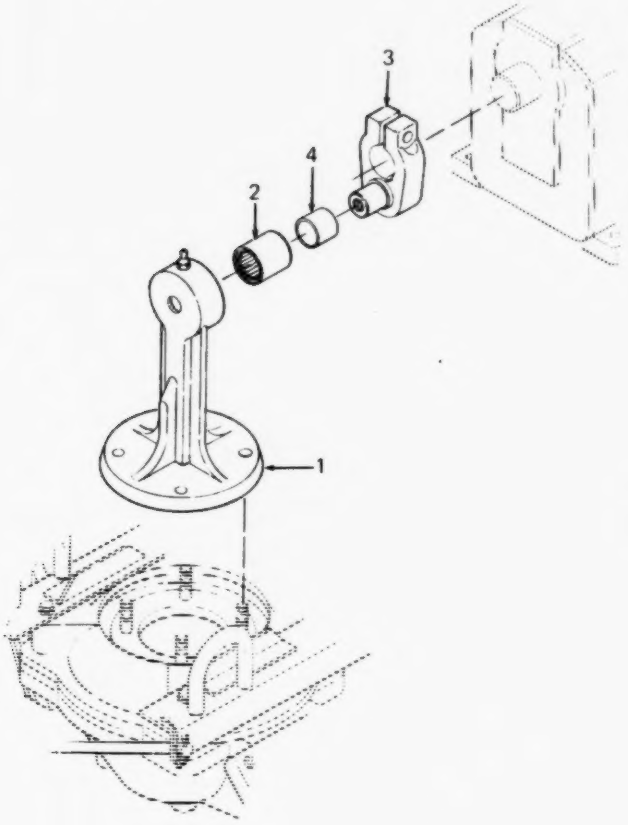
None

General Safety Instructions

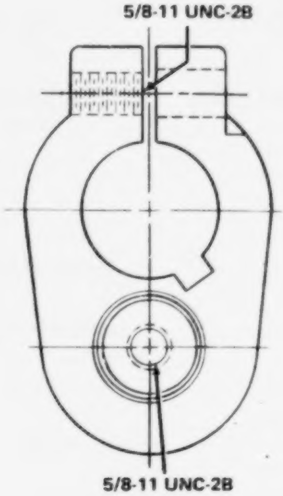
Compressed air for cleaning shall not exceed 30 psi (207 kPa). Use goggles or face shield to prevent eye injury from flying chips.

CRANK AND CONNECTING ROD (CONT)

Location/Item	Action	Remarks
DISASSEMBLY		
1. Bearing	Remove roller bearing (2) from connecting rod (1).	
2. Inner race	Use a mechanical gear and bearing puller to remove inner race (4) from crank (3).	

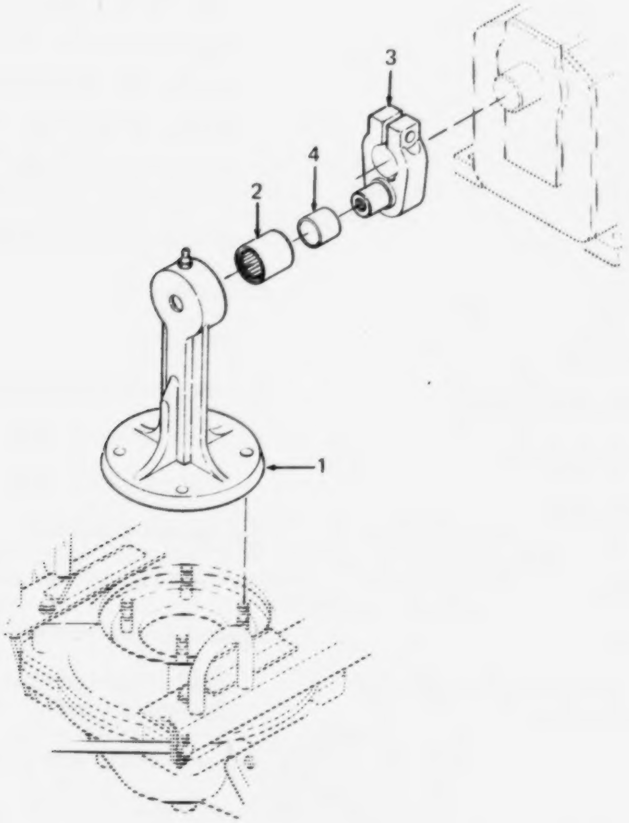


CRANK AND CONNECTING ROD (CONT)

Location/Item	Action	Remarks
REPAIR		
3. Crank	Use 5/8-11 UNC-2B tap and handle to repair threads. Blow out chips with compressed air.	 5/8-11 UNC-2B 5/8-11 UNC-2B

CRANK AND CONNECTING ROD (CONT)

Location/Item	Action	Remarks
ASSEMBLY		
4. Bearing	Use an arbor press to install bearing (2) into connecting rod (1).	
5. Inner race	Use an arbor press to install inner race (4) on crank (3).	



5-11. GEAR REDUCER

This task covers:

a. Disassembly

b Inspection

c. Cleaning

d. Assembly

INITIAL SETUP

Test Equipment

None

Tools

Shop equipment, automotive maintenance and repair NSN 4910-00-754-0654

- Wrench, 7/16 inch
- Wrench, 3/8 inch
- Wrench, 9/16 inch, or
- Socket, 9/16 inch, and handle
- Screwdriver, 1/4 inch blade
- Puller, mechanical, gear and bearing
- Pliers, retaining ring
- Pliers, hose clamp
- Torque wrench, 0-175 ft lb (0-250 N·m) NSN 5120-00-640-6364
- Drain pan
- Arbor press

Materials/Parts

Gear reducer (Appendix C, item 1, fig. 9)

Cleaning solvent, P-D-680

Loctite No. 242 (05972)

Sealer, Silmate No. A689005AA-006 (02787)

Lubricating oil, gear, multipurpose, MIL-M-2105, Grade 90

Grease, ball and roller bearing, MIL-G-18709

References

None

Troubleshooting References

Malfunction 1, step 1

Malfunction 2, step 1

Equipment Condition

Gear reducer removed from pump assembly

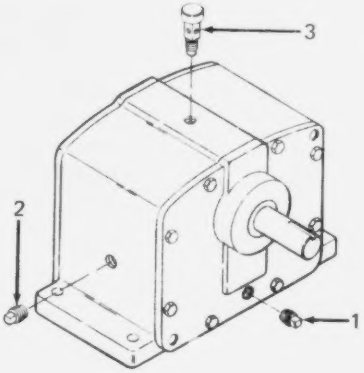
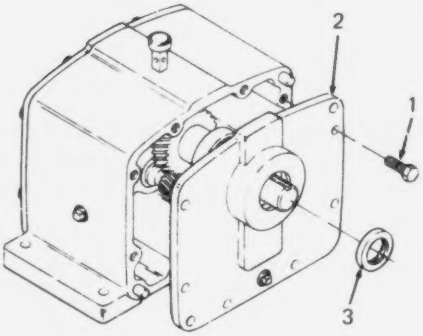
Special Environmental Conditions

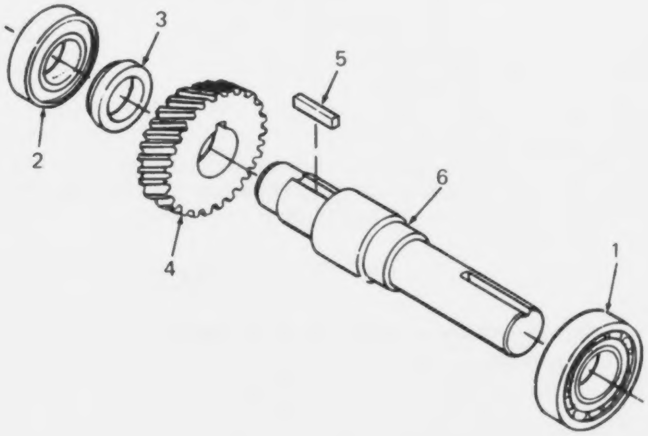
Well-ventilated area required when solvent is used.

General Safety Instructions

None

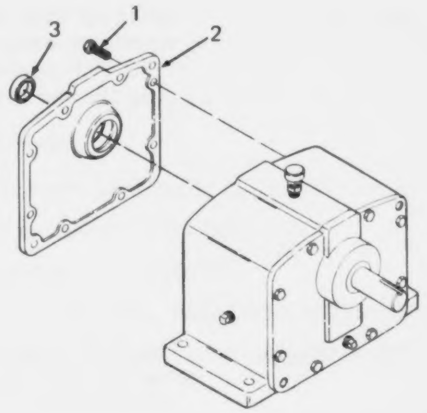
GEAR REDUCER (CONT)

Location/Item	Action	Remarks
DISASSEMBLY		
1. Drain oil	Drain oil into drain pan. Use 3/8 inch wrench to remove drain plug (1). Use 7/16 inch wrench to remove level plug (2) and breather (3).	
2. Output cover	Use 9/16 inch socket and handle to remove eight cap screws (1). Remove output cover (2). Remove and discard output seal (3).	
3. Output shaft	Remove output shaft from gear reducer as an assembly. Use gear and bearing mechanical puller to remove outboard bearing (1) and inboard bearing (2) from output shaft (6). Remove spacer (3).	

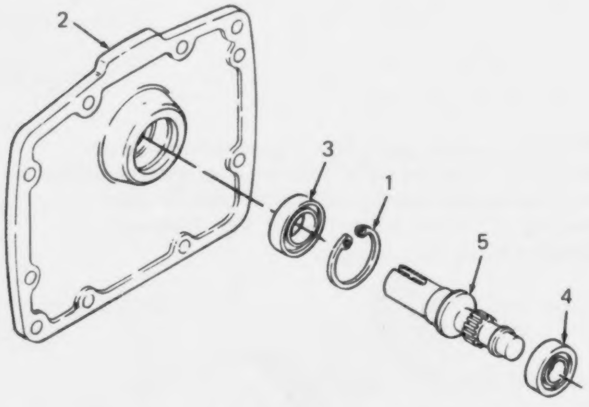


GEAR REDUCER (CONT)

Location/Item	Action	Remarks
4. Gear	Use gear and bearing mechanical puller to remove gear (4) from output shaft (6). Remove key (5).	
5. Input cover	Use 9/16 inch socket and handle to remove eight cap screws (1). Remove input cover (2). Remove and discard input seal (3).	



Location/Item	Action	Remarks
6. Input shaft	Use retaining ring pliers to remove snap ring (1) from input cover (2). Remove input shaft (5) with bearings (3 and 4) from input cover (2).	



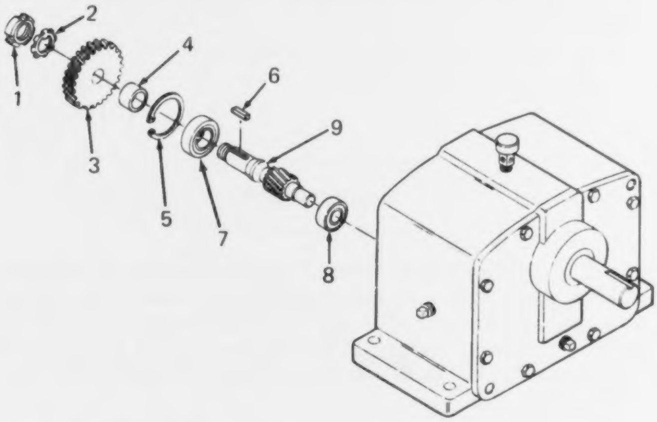
Location/Item	Action	Remarks
7. Bearings	Use gear and bearing mechanical puller to remove input cover bearing (3) and input bearing (4) from input shaft (5).	

NOTE

Pinion and input shaft are a permanent assembly. Do not attempt to separate them.

GEAR REDUCER (CONT)

Location/Item	Action	Remarks
8. Gear	Use screwdriver to press tang of lockwasher (2) away from locknut (1). Use hose clamp pliers to remove locknut (1). Remove lockwasher (2). Use gear and bearing mechanical puller to remove gear (3).	



Location/Item	Action	Remarks
9. Jackshaft spacer and key	Remove key (6) from jackshaft (9). Remove jackshaft spacer (4).	
10. Jackshaft	Use retaining ring pliers to remove snap ring (5) from groove in reducer housing bore. Remove jackshaft (9), bearing (7), and bearing (8) as an assembly.	
11. Bearings	Use gear and bearing mechanical puller to remove bearings (7 and 8) from jackshaft (9).	

INSPECTION

Location/Item	Action	Remarks
12. Covers	Inspect input and output covers for cracks and warpage. Replace if damaged.	
13. Output shaft	Inspect for damaged keyways and galled bearing journals. Replace if damaged.	
14. Input shaft and jackshaft	Inspect for damaged keyways, galled bearing journals, and damaged gear teeth. Replace if damaged.	

GEAR REDUCER (CONT)

Location/Item	Action	Remarks
15. Bearings	Bearings must turn freely without binding. Inspect for brinelled or burnished areas. Replace damaged bearing.	
16. Gears	Inspect for chipped or eroded gear teeth. Any evidence of gear tooth damage will require gear replacement.	

CLEANING

WARNING

Clean parts in a well-ventilated area. Avoid inhalation of solvent fumes and prolonged exposure of skin to cleaning solvent. Wash exposed skin thoroughly. Dry cleaning solvent (fed spec P-D-680) used to clean parts is potentially dangerous to personnel and property. Do not use near open flame or excessive heat. Flash point of solvent is 100° F (38° C).

Location/Item	Action	Remarks
17. Covers and gear housing	Clean with cleaning solvent, P-D-680. Use a stiff-bristle brush to remove caked dirt. After cleaning wipe all bearing bores with light oil.	
18. Bearings		

CAUTION

Do not spin bearing when cleaning. Damage can result from spinning.

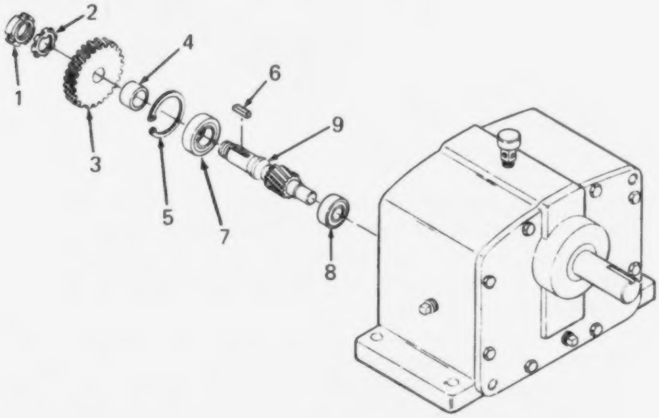
Location/Item	Action	Remarks
	Soak the bearings in dry cleaning solvent, P-D-680, and use a soft-bristle brush to remove old grease. After cleaning, dip the bearing in light oil and wrap in lint-free paper until ready to assemble.	
19. Input shaft, output shaft, jackshaft, and gears	Wash in dry cleaning solvent, P-D-680. Use a soft-bristle brush to remove old grease. After cleaning, wipe with light oil and wrap in lint-free paper until ready to assemble.	

GEAR REDUCER (CONT)

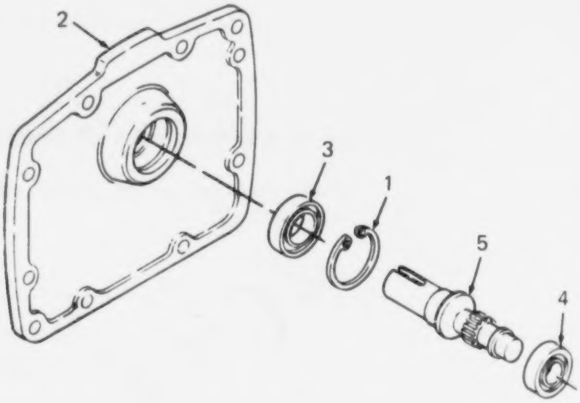
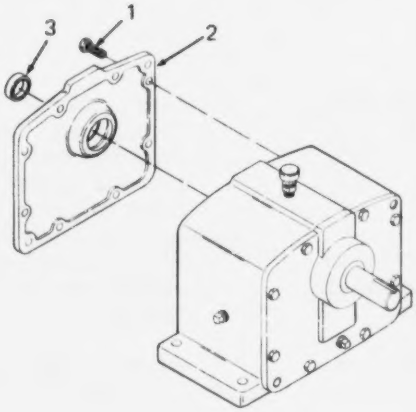
ASSEMBLY

NOTE

Prior to assembly, pack all bearings in grease, MIL-G-18709.

Location/Item	Action	Remarks
20. Bearings	Using an arbor press, install bearings (7 and 8) on jackshaft (9). 	
21. Jackshaft	Insert jackshaft (9) with bearings (7 and 8) through gear housing web from the input side. Press jackshaft (9) until bearing (7) is seated past the snap ring groove. Use retaining ring pliers to install snap ring (5).	
22. Jackshaft spacer and key	Slide jackshaft spacer (4) over jackshaft and against bearing (7). Install key (6) into jackshaft keyway.	
23. Gear on jackshaft	Align keyway in gear (3) with key (6), and press gear on jackshaft (9). Slide keyed lockwasher (2) on jackshaft. Apply Loctite No. 242 on threads of locknut (1) and install locknut. When locknut is snug against lockwasher, align a flat of the locknut with a tang of the lockwasher. Bend tang over locknut flat.	

GEAR REDUCER (CONT)

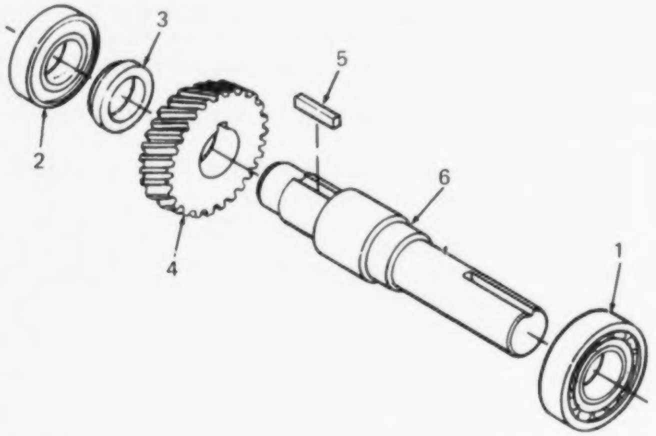
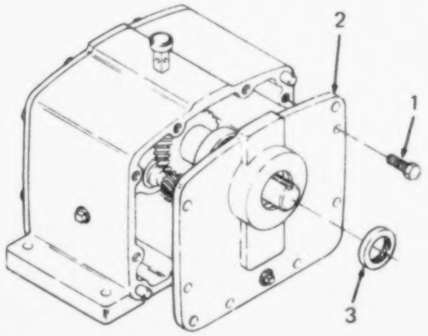
Location/Item	Action	Remarks
24. Bearings on input shaft	Using an arbor press, install bearings (3 and 4) on input shaft (5).  	
25. Input shaft	Insert input shaft (5) with bearings (3 and 4) into and through input cover (2). Press input cover bearing (3) into input cover (2) until it is seated past snap ring groove. Use retaining ring pliers to install snap ring (1).	
26. Input cover	Coat mounting face of input cover (2) with sealer, Silmate No. A689005AA-006. Assemble input cover (2) to gear housing.  	

NOTE

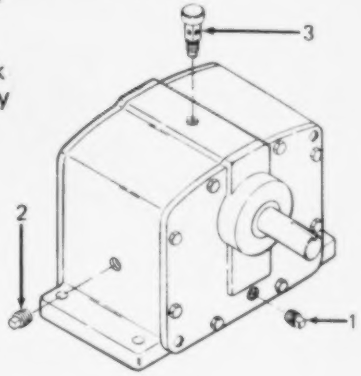
Engage input shaft gear with jackshaft gear when installing input cover.

Apply Loctite No. 242 to threads of eight cap screws (1). Use 9/16 inch socket and torque wrench to tighten cap screws to 31 ft lb (42 N·m). Pack grease, MIL-G-18709, in input bearing cavity in input cover (2) and install new seal (3) flush with input cover face.

GEAR REDUCER (CONT)

Location/Item	Action	Remarks
27. Gear on output shaft	Install key (5) into keyway of output shaft (6). Align keyway in gear (4) with key (5), and press gear on output shaft (6) until it bottoms against the shaft shoulder.  	
28. Output shaft	Install spacer (3) against gear (4). Press inboard bearing (2) on output shaft (6) and against spacer (3). Press outboard bearing (1) on output shaft until it bottoms against the output shaft shoulder.	
29. Install output shaft	Install output shaft assembly into gear housing until inboard bearing (2) bottoms on shoulder of bearing bore. **NOTE** **Engage output shaft gear with jackshaft gear.**	
30. Output cover	Coat output cover (2) mounting face with sealer, Silmate No. A689005AA-006. Assemble output cover to gear housing. Apply Loctite No. 242 to threads of eight cap screws (1).	

GEAR REDUCER (CONT)

Location/Item	Action	Remarks
	CAUTION **Align bearing bores with bearings being careful not to cock either bearing bore. Tighten cap screws evenly and with equal torque.**	
	Use 9/16 inch socket and torque wrench to tighten cap screws to 31 ft lb (42 N·m). Pack grease, MIL-G-18709, in output bearing cavity in output cover (2) and install new seal (3) flush with output cover face.	
31. Fill with oil	Use 3/8 inch wrench to install drain plug (1). Fill gear reducer through breather (3) hole with lubricating oil, MIL-M-2105, Grade 90, until oil starts to flow from level plug hole. Use 7/16 inch wrench to install level plug (2). Install breather (3).	

APPENDIX A
REFERENCES

A-1. SCOPE

This appendix lists all forms, field manuals, and technical manuals referenced in this manual.

A-2. FORMS

Quality Deficiency Report	SF 368
Recommended Changes to Publications and Blank Forms	DA 2028

A-3. TECHNICAL MANUALS

Operator's, Organizational, Direct Support and General Support Maintenance: Engine, Gasoline, 3HP, Military Standard Models	TM 5-2805-257-14
Organizational, Intermediate (Field) Direct and General Support and Depot Maintenance Repair Parts and Special Tools List: Engine, Gasoline, 3HP, Military Standard Models	TM 5-2805-257-24P
Procedures for Destruction of Equipment to Prevent Enemy Use	TM 750-244-3
The Army Maintenance Management System	DA PAM 738-750

A-4. MISCELLANEOUS PUBLICATIONS

Lubrication Order: Pump, Reciprocating, Power-Driven, Diaphragm, Gasoline-Engine-Driven, Wheel Mounted, US40CDG	LO 5-4320-275-12

APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

-1. MAINTENANCE ALLOCATION CHART (MAC)

a. *General.* This MAC assigns maintenance functions in accordance with the Three Level Maintenance concept. he three levels are depicted on the MAC as:

UNIT level—corresponds to an O code in the Repair Parts and Special Tools List (RPSTL). A C code entry under UNIT denotes maintenance performed by the crew or operator within UNIT maintenance.

INTERMEDIATE level—corresponds to an F or H code in the RPSTL.

DEPOT level—corresponds to a D code in the RPSTL.

b. *Unit Maintenance.* Maintenance to be performed in the Unit level is described as follows:

(1) Unit Maintenance activities are staffed and equipped to perform high frequency on-equipment maintenance sks required to retain or return equipment to a serviceable condition. These tasks include preventive maintenance nd repair and replace functions associated with a high level of mission capability.

(2) Unit Maintenance inspection and servicing include daily (usually performed by operator or crew), periodic, nd special inspections, as authorized by the MAC or higher headquarters.

(3) Unit level maintains a Combat Prescribed Load List (PLL) which consists of items on the Mandatory Parts st (MPL) and items which are demand supported.

(4) Unit level performs troubleshooting, replace, and limited repair functions as authorized by the MAC, RPSTL, nd applicable technical manuals.

c. *Intermediate Maintenance.* Maintenance to be performed in the Intermediate level is described as follows:

(1) One stop maintenance support through use of mobile weapon system oriented maintenance teams to perform authorized maintenance (that exceeds Unit level capability) to effect quick repair and return to user capabilities.

(2) Maintains a Combat Authorized Stockage List (ASL), Mandatory Parts List (MPL), Direct Exchange (DX), nd provides limited Operational Readiness Float (ORF) for supported units.

(3) Provides collection, classification, and recovery services for serviceable and unserviceable materiel and aintains a Battle Damage Assessment (BDA) capability.

(4) Provides maintenance support for the threater supply system through repair of components and DX items.

(5) Provides maintenance units composed of commodity oriented platoons which may be augmented by support teams that deploy forward if the tactical situation permits.

(6) Maintains Operational Readiness Float (ORF) stocks in support of the theater.

d. *Depot Maintenance.* Depot level functions are authorized as indicated by entries in the Depot (D) Maintenance level column (4) in the MAC.

B-2. USE OF THE MAINTENANCE ALLOCATION CHART, SECTION II

a. The MAC assigns maintenance functions based on the following considerations:

(1) Skills available.

(2) Work time required.

(3) Tools and test equipment required and/or available.

b. If a lower level of maintenance identified in column (4) of the MAC cannot perform all tasks of a single maintenance function (e.g., test, repair), then the higher level that can perform other tasks of that function is also indicated.

c. Higher maintenance levels are automatically authorized to perform maintenance functions assigned to a lower maintenance level.

d. Higher maintenance levels will perform the maintenance functions of lower maintenance levels when required or directed by the Commander who has authority to direct such tasking.

e. Assignment of a maintenance function in the MAC does not carry automatic authorization to carry the related spare or repair parts in stock. Information to requisition or secure parts will be as specified in the associated RPSTL.

f. Normally, there will be no deviation from the assigned level of maintenance. However, in cases of operational necessity, maintenance functions assigned a higher level may, at the request of the lower level, be assigned to the lower level on a one-time basis, if specifically authorized by the maintenance officer of the higher level to which the function is assigned. In such a case, the special tools, equipment, etc., required by the lower level to perform this function will be furnished by the higher level assigned the function. Also, transfer of a function to a lower level does not relieve the higher level of responsibility for the function, so the higher level will provide technical supervision and inspection of the function being performed at the lower level.

B-3. MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

a. *Inspect.* Two levels of inspect are covered in the MAC.

(1) When prescribed at the C or O element of Unit Maintenance level, inspect means to determine serviceability by comparing an item's physical, mechanical, and/or electrical characteristics with established standards through examination (i.e., by sight, sound, or feel). These inspections are included in preventive maintenance (PM) checks and services, such as PMCS, PMD.

(2) When prescribed at the Intermediate (F) or Depot (D) maintenance level, inspect refers to an initial inspection which is conducted prior to scheduling any repair on repairable items evacuated to this level. This inspection is made to determine whether an item qualifies for repair or discard.

b. *Test.* To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. *Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate), to preserve, to drain, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. *Adjust.* To maintain within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to the specified parameters.

e. *Align.* To adjust specified variable elements of an item to bring about optimum or desired performance.

f. *Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipment used in precision measurement. Consists of comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

g. *Install.* The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. *Replace.* The act of substituting a serviceable like type part, a subassembly, or module (component or assembly) for an unserviceable counterpart.

i. *Repair.* The application of maintenance services (inspect, test, service, adjust, align, calibrate, or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining, or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

j. *Overhaul.* That maintenance effort (service/action) necessary to restore an item to a completely serviceable operational condition as prescribed by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to a like new condition.

k. *Rebuild.* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

B-4. EXPLANATION OF COLUMNS IN THE MAC, SECTION II

a. *Column (1), Group Number.* Column 1 lists functional group code numbers which are assigned to identify maintenance significant components, assemblies, subassemblies, and modules to their next higher assembly.

b. *Column (2), Component/Assembly.* Column 2 contains the item names of components, assemblies, subassemblies, and modules for which group numbers (column 1) are assigned and for which maintenance is authorized.

c. *Column (3), Maintenance Function.* Column 3 lists the functions to be performed on items listed in column 2. (Function definitions are contained in paragraph B-3.)

d. *Column (4), Maintenance Level.* The maintenance levels, Unit, Intermediate, and Depot, are allotted separate subcolumns within column 4. Entry of a work time figure (such as 1.0, 0.2) in a subcolumn indicates that that level is authorized to perform the function listed in column 3, and the average time required to do the function is the work time figure. If the number or complexity of tasks within a maintenance function varies from one maintenance level to another, the applicable work time figure for each level will be entered for that function. The work time figure represents the average time it takes to restore a component/assembly to a serviceable condition under a typical field operating environment.

e. *Column (5), Tools and Equipment.* Column 5 specifies, by code, common tool sets (not individual tools from those sets), common TMDE, and special tools, TMDE, and support equipment required to perform a designated function. The code in Column 5 keys to the listing in Section III of the MAC.

f. *Column (6), Remarks.* This column, when applicable, contains a letter code which is keyed to an explanation of the code contained in Section IV of the MAC.

B-5. EXPLANATION OF COLUMNS IN THE MAC, SECTION III

a. *Column (1), Tool or Test Equipment Reference Code.* The tool or test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. *Column (2), Maintenance Category.* The lowest category of maintenance authorized to use the tool or test equipment.

c. *Column (3), Nomenclature.* Name or identification of the tool or test equipment.

d. *Column (4), National/NATO Stock Number.* The national stock number of the tool or test equipment.

e. *Column (5), Tool Number.* The manufacturer's part number.

B-6. EXPLANATION OF COLUMNS IN THE MAC, SECTION IV

a. *Column (1), Reference Code.* The code recorded in Column 6, Section II.

b. *Column (2), Remarks.* This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		INTERMEDIATE		DEPOT		
			C	O	F	H	D		
01	ENGINE								
0100	Engine Assembly	Inspect	0.2						
		Service		1.0				1	A
		Replace		1.0				1	
	(See TM5-2805-257-14)	Repair			16			1	
02	FUEL SYSTEM								
0200	Tank, Line, Fittings, & Filter	Inspect	0.2						
		Service	0.2					1	
		Replace		0.5				1	
03	FRAME								
0300	Wheel Assembly	Inspect	0.2						
		Service	0.2					1	
		Replace		1.0					
0301	Frame Assembly	Inspect	0.2						
		Service	0.2						
		Replace		1.0				1	
		Repair			2.0			2	
04	ACCESSORY ITEMS								
0400	Data Plates	Inspect	0.2						
		Replace		2.0				2	
0401	Suction Lines	Inspect	0.2						
		Replace		0.1					

Section II. MAINTENANCE ALLOCATION CHART—Continued

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL UNIT C	UNIT O	INTERMEDIATE F	INTERMEDIATE H	DEPOT D	(5) TOOLS AND EQUIPMENT	(6) REMARKS
05	PUMP								
0500	Accumulator, Check Valve Assemblies, & Discharge Port	Inspect	0.2						
		Service	0.4						
		Replace		2.0				2	
		Repair			3.0			2	
0501	Diaphragm, Connecting Rod Assembly,& Gear Reducer	Inspect	0.2						
		Service		1.0				2	
		Replace		1.0				2	
		Repair			3.0			2	

APPENDIX C

ORGANIZATIONAL AND DIRECT SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST

Section I. INTRODUCTION

C-1. SCOPE

This manual lists spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE), and other special support equipment required for performance of organizational and direct support maintenance of the US40CDG pump. It authorizes the requisitioning and issue of spares and repair parts as indicated by the source and maintenance codes.

C-2. GENERAL

This Repair Parts and Special Tools List is divided into the following sections:

a. *Section II. Repair Parts List.* A list of spares and repair parts authorized for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in numeric sequence, with the parts in each group listed in figure and item number sequence. Bulk materials are listed in NSN sequence.

b. *Section III. Special Tools List.* A list of special tools, special TMDE, and other special support equipment authorized for the performance of maintenance.

c. *Section IV. National Stock Number and Part Number Index.* A list, in National item identification number (NIIN) sequence, of all National stock numbers (NSN) appearing in the listings, followed by a list in alphameric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance.

C-3. EXPLANATION OF COLUMNS

a. *Illustration.* This column is divided as follows:

(1) *Figure Number.* Indicates the figure number of the illustration on which the item is shown.

(2) *Item Number.* The number used to identify item called out in the illustration.

b. *Source, Maintenance, and Recoverability (SMR) Codes.*

(1) *Source Code.* Source codes indicate the manner of acquiring support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code	*Definition*
PA	– Item procured and stocked for anticipated or known usage.
PB	– Item procured and stocked for insurance purpose because essentiality dictates that a minimum quantity be available in the supply system.
PC	– Item procured and stocked and which otherwise would be coded PA except that it is deteriorative in nature.

Code *Definition*

PD – Support item, excluding support equipment, procured for initial issue or outfitting, and stocked only for subsequent or additional initial issues or outfittings. Not subject to automatic replenishment.

PE – Support equipment procured and stocked for initial issue or outfitting to specified maintenance repair activities.

PF – Support equipment which will not be stocked but which will be centrally procured on demand.

PG – Item procured and stocked to provide for sustained support for the life of the equipment. It is applied to an item peculiar to the equipment which, because of probable discontinuance or shutdown of production facilities, would prove uneconomical to reproduce at a later time.

KD – An item of a depot overhaul/repair kit and not purchased separately. Depot kit defined as a kit that provides items required at the time of overhaul or repair.

KF – An item of a maintenance kit and not purchased separately. Maintenance kit defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.

KB – Item included in both a depot overhaul/repair kit and a maintenance kit.

MO – Item to be manufactured or fabricated at organizational level.

MF – Item to be manufactured or fabricated at the direct support maintenance level.

MH – Item to be manufactured or fabricated at the general support maintenance level.

MD – Item to be manufactured or fabricated at the depot maintenance level.

AO – Item to be assembled at organizational level.

AF – Item to be assembled at direct support maintenance level.

AH – Item to be assembled at general support maintenance level.

AD – Item to be assembled at depot maintenance level.

XA – Item is not procured or stocked because the requirements for the item will result in the replacement of the next higher assembly.

XB – Item is not procured or stocked. If not available through salvage, requisition.

XC – Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.

XD – A support item that is not stocked. When required, item will be procured through normal supply channels.

NOTE

Cannibalization or salvage may be used as a source of supply for any items coded above except those coded XA and aircraft support items as restricted by AR 700-42.

(2) *Maintenance Code.* Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance.

Code	*Application/Explanation*
C	– Crew or operator maintenance performed within organizational maintenance.
O	– Support item is removed, replaced, used at the organizational level.
F	– Support item is removed, replaced, used at the direct support level.
H	– Support item is removed, replaced, used at the general support level.
D	– Support items that are removed, replaced, used at depot, mobile depot, or specialized repair activity only.

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes.

Code	*Application/Explanation*
O	– The lowest maintenance level capable of complete repair of the support item is the organizational level.
F	– The lowest maintenance level capable of complete repair of the support item is the direct support level.
H	– The lowest maintenance level capable of complete repair of the support item is the general support level.
D	– The lowest maintenance level capable of complete repair of the support item is the depot level.
Z	– Nonreparable. No repair is authorized.
B	– No repair is authorized. The item may be reconditioned by adjusting, lubricating, etc., at the user level. No parts or special tools are procured for the maintenance of this item.

(3) *Recoverability Code.* Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows:

Recoverability Codes	*Definition*
Z	– Nonreparable item. When unserviceable, condemn and dispose at the level indicated in position 3.
O	– Reparable item. When uneconomically reparable, condemn and dispose at organizational level.
F	– Reparable item. When uneconomically reparable, condemn and dispose at the direct support level.

Recoverability Codes	*Definition*
H	– Reparable item. When uneconomically reparable, condemn and dispose at the general support level.
D	– Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.
L	– Reparable item. Repair, condemnation, and disposal not authorized below depot/specialized repair activity level.
A	– Item requires special handling or condemnation procedures because of specific reasons (i.e., precious metal content, high dollar value, critical material or hazardous material). Refer to appropriate manuals/directives for specific instructions.

c. *National Stock Number.* Indicates the National stock number assigned to the item and which will be used for requisitioning.

d. *Part Number.* Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE

When a stock numbered item is requisitioned, the item received may have a different part number than the part being replaced.

e. *Federal Supply Code for Manufacturer (FSCM).* The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

f. *Description.* Indicates the Federal item name and, if required, a minimum description to identify the item. In the Special Tools List, the initial basis of issue (BOI) appears as the last line in the entry for each special tool, special TMDE, and other special support equipment. When density of equipments supported exceeds density spread indicated in the basis of issue, the total authorization is increased accordingly.

g. *Unit of Measure (U/M).* Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr, etc). When the unit of measure differs from the unit of issue, the lowest unit of issue that will satisfy the required units of measure will be requisitioned.

h. *Quantity Incorporated in Unit.* Indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that no specific quantity is applicable, (e.g., shims, spacers, etc).

C-4. HOW TO LOCATE REPAIR PARTS

a. *When National Stock Number or Part Number is Unknown:*

(1) *First.* Using the table of contents, determine the functional group within which the item belongs. This is necessary since illustrations are prepared for functional groups, and listings are divided into the same groups.

(2) *Second.* Find the illustration covering the functional group to which the item belongs.

(3) *Third.* Identify the item on the illustration and note the illustration figure and item number of the item.

(4) *Fourth.* Using the Repair Parts Listing, find the figure and item number noted on the illustration.

b. *When National Stock Number or Part Number is Known:*

(1) *First.* Using the Index of National Stock Numbers and Part Numbers, find the pertinent National stock number or part number. This index is in NIIN sequence followed by a list of part numbers in alphameric sequence, cross-referenced to the illustration figure number and item number.

(2) *Second.* After finding the figure and item number, locate the figure and item number in the repair parts list.

C-5. ABBREVIATIONS

Abbreviations	*Explanation*
ASSY	Assembly
CONN	Connecting
HEX	Hexagon
IDENT	Identification

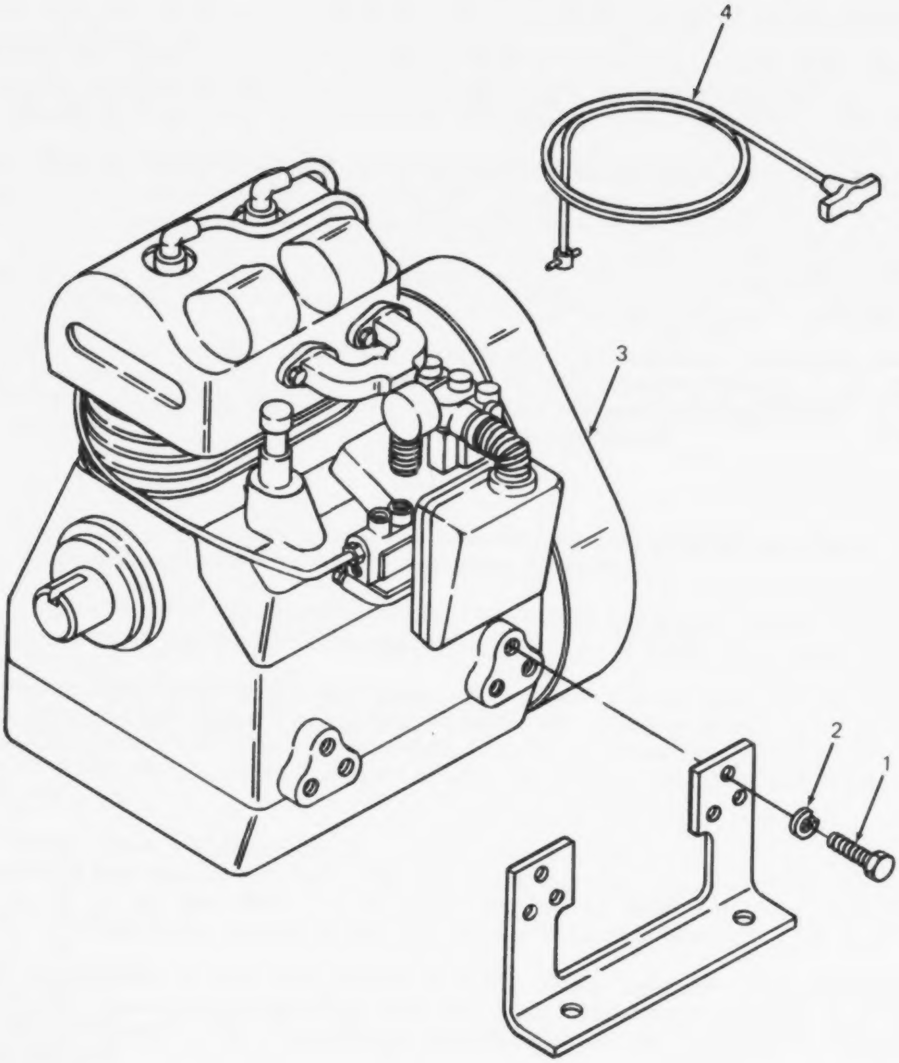


Figure 1. Engine Assembly.

(1) ILLUSTRATION (a) FIG NO.	(1) ILLUSTRATION (b) ITEM NO.	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						Section II. REPAIR PARTS LIST		
						GROUP 01 ENGINE		
1	1	PAOZZ	5305-00-068-0502	96906	MS90725-6	SCREW,CAP,HEXAGON HEAD	EA	12
1	2	PAOZZ	5310-00-582-5965	96906	MS35338-44	WASHER,LOCK	EA	12
1	3	PAOFH	2805-01-169-1100	97403	2A016-4	ENGINE,GASOLINE (REFERENCE TM 5-2805-257-24P FOR PARTS BREAKDOWN)	EA	1
1	4	PAOZZ	2990-00-972-7950	97403	9786E121	STARTER ROPE, ENGINE	EA	1

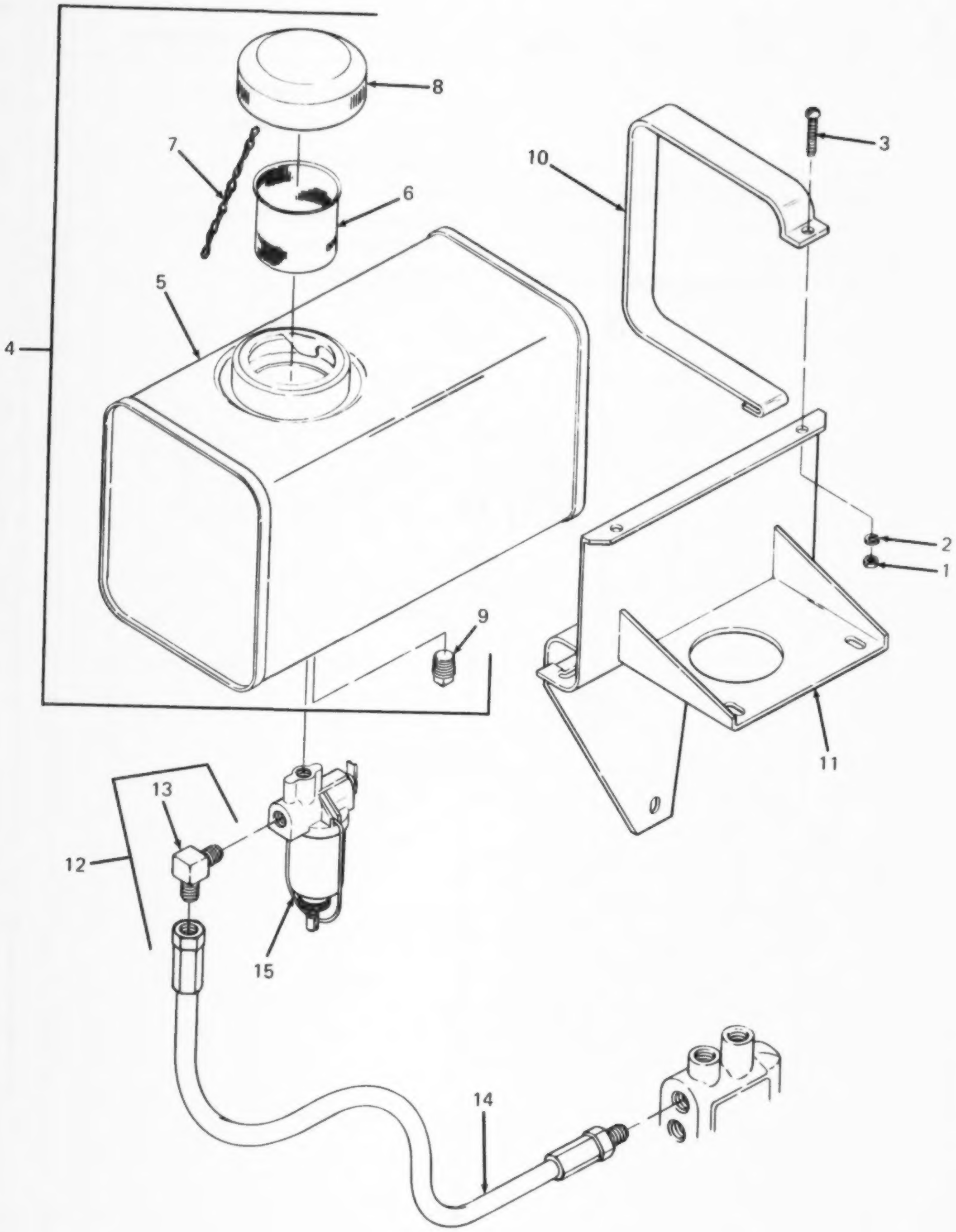

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Figure 2. Tank, Line, Fittings, and Filter.

(1) ILLUSTRATION (a) FIG NO	(b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
						GROUP 02 FUEL SYSTEM		
2	1	PAOZZ	5310-01-012-7400	05748	15361	NUT,PLAIN,HEXAGON	EA	2
2	2	PAOZZ	5310-00-045-3296	96906	MS35338-43	WASHER,LOCK	EA	2
2	3	PAOZZ	5305-00-068-1802	96906	MS35218-59	SCREW,MACHINE	EA	2
2	4	PAOZH	2910-00-707-7502	97403	13200E8821	TANK,FUEL,ENGINE	EA	1
2	5	XAOZZ		05748	18326	BODY,FUEL TANK	EA	1
2	6	PAOZZ	2910-00-697-1384	05748	18327	.STRAINER ELEMENT,SEDIMENT	EA	1
2	7	XBOZZ		05748	18328	.CHAIN,CAP NO.18 STEEL,SINGLE JACK,APPROX 3.75 IN.LG	EA	1
2	8	PAOZZ	2910-00-605-1353	29510	193421H1	.CAP,FILLER OPENING	EA	1
2	9	PAOZZ	4730-00-163-4680	05748	03200	.PLUG,PIPE	EA	1
2	10	PAOZZ		97403	13200E8823	STRAP,FUEL TANK	EA	2
2	11	XBOZZ		05748	183105A	BRACKET,FUEL TANK	EA	1
2	12	XBOOO		05748	334815A	FUEL LINE ASSEMBLY	EA	1
2	13	PAOZZ	4730-00-810-0059	05748	35564	.ELBOW,PIPE	EA	1
2	14	PAOZZ	4720-00-904-6608	05748	24959	.HOSE ASSEMBLY,NONMETALLIC	EA	1
2	15	PAOZZ	2910-00-905-9792	96906	MS51086-1	STRAINER,SEDIMENT	EA	1

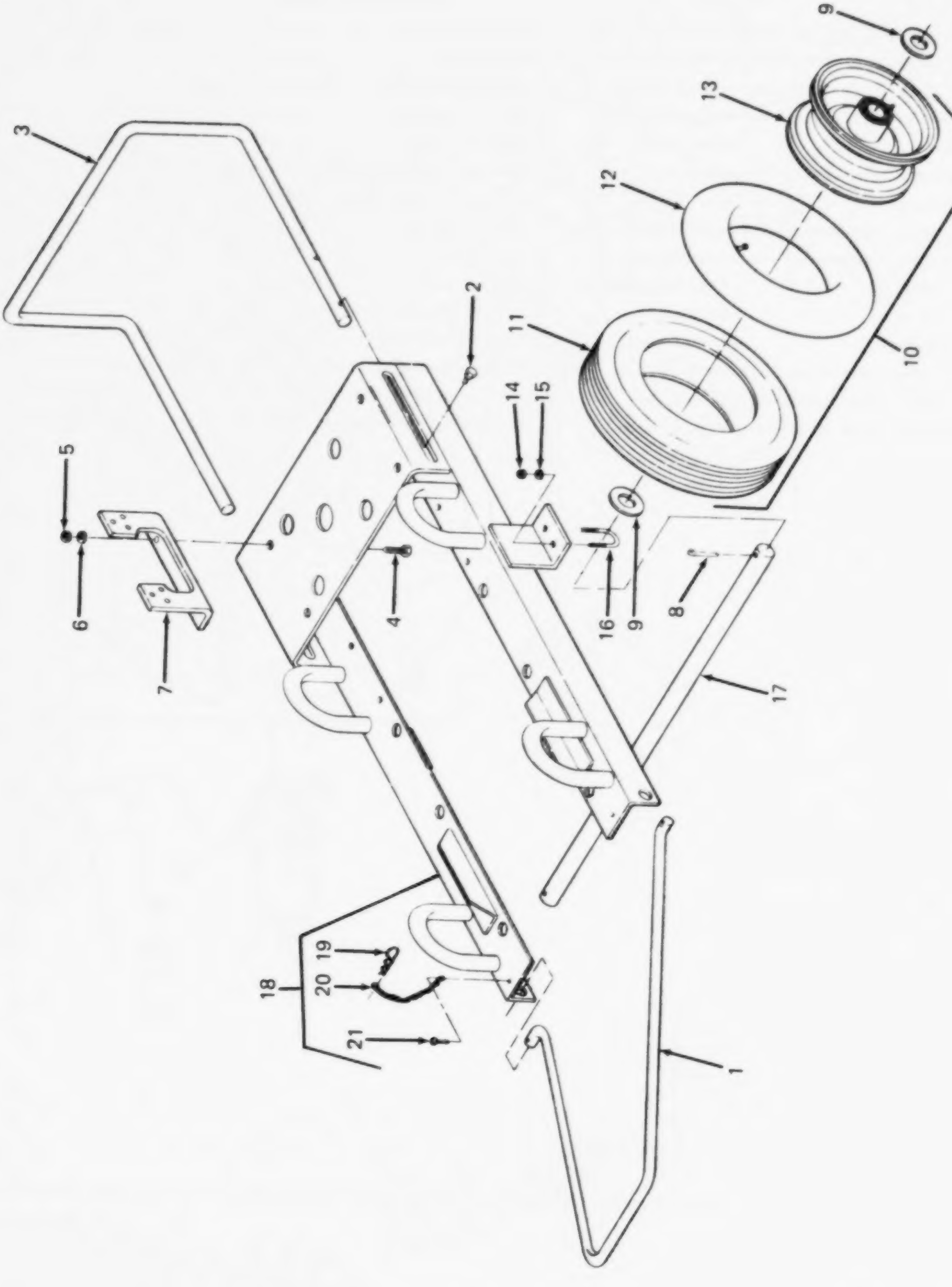
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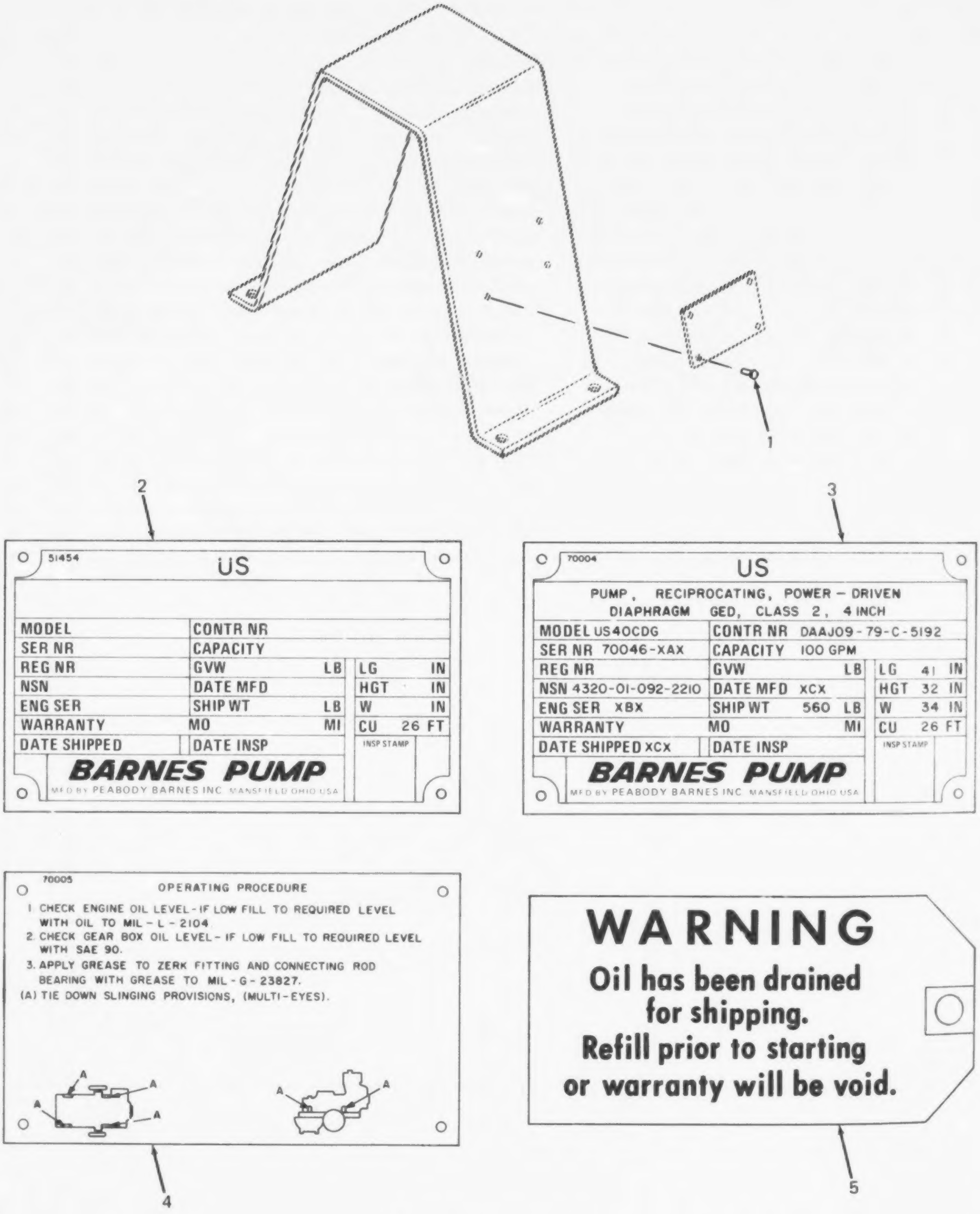
Figure 3. Frame Assembly and Wheels.

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) FIG NO	(b) ITEM NO	SMR CODE	NATIONAL STOCK NUMBER	FSCM	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 03 FRAME		
3	1	PBOZZ	3920-01-120-4664	05748	70047	DRAW BAR	EA	1
3	2	PAOZZ	5306-01-132-5599	05748	70554	BOLT,SHOULDER	EA	4
3	3	PBOZZ	4320-01-132-4909	05748	70050	GUARD,ENGINE	EA	1
3	4	PAOZZ	5305-00-269-3211	96906	MS90725-60	SCREW,CAP,HEXAGON HEAD	EA	4
3	5	PAOZZ	5310-00-732-0558	96906	MS51967-8	NUT,PLAIN,HEXAGON	EA	4
3	6	PAOZZ	5310-00-637-9541	96906	MS35338-46	WASHER,LOCK	EA	4
3	7	XBOZZ		05748	70020	BRACKET,ENGINE	EA	2
3	8	PAOZZ	5315-00-849-9854	96906	MS24665-498	PIN,COTTER	EA	2
3	9	PAOZZ	5310-00-543-2500	96906	MS15795-826	WASHER,FLAT	EA	4
3	10	XDOOO	2530-01-132-7493	11431	52349551	WHEEL&TIRE ASSEMBLY	EA	2
3	11	PBOZZ		11431	9551	.TIRE	EA	2
3	12	PAOOO		11431	9474	..TUBE,INNER	EA	1
3	13	XDOZZ		11431	5234	.WHEEL	EA	2
3	14	PAOZZ	5310-00-761-6882	96906	MS51967-2	NUT,PLAIN,HEXAGON	EA	4
3	15	PAOZZ	5310-00-582-5965	96906	MS35338-44	WASHER,LOCK	EA	4
3	16	PAOZZ	5306-01-132-0503	05748	62272	U-BOLT	EA	2
3	17	PBOZZ	4320-01-130-1285	05748	70039	AXLE,PUMP	EA	1
3	18	XBOFF		05748	70027SA	BASE ASSEMBLY	EA	1
3	19	PAOZZ		05748	70048	.PIN,HITCH	EA	2
3	20	XBOZZ		05748	38737	.CHAIN NO.16 STEEL, SINGLE JACK,APPROX 4 IN.LG	EA	2
3	21	PAOZZ	5305-00-052-5050	96906	MS24630-35	.SCREW,TAPPING,THREAD	EA	2



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US

MODEL	CONTR NR	
SER NR	CAPACITY	
REG NR	GVW LB	LG IN
NSN	DATE MFD	HGT IN
ENG SER	SHIP WT LB	W IN
WARRANTY	MO MI	CU 26 FT
DATE SHIPPED	DATE INSP	INSP STAMP

BARNES PUMP

MFD BY PEABODY BARNES INC MANSFIELD OHIO USA

70004

US

PUMP, RECIPROCATING, POWER – DRIVEN
DIAPHRAGM GED, CLASS 2, 4 INCH

MODEL US40CDG	CONTR NR DAAJ09-79-C-5192	
SER NR 70046-XAX	CAPACITY 100 GPM	
REG NR	GVW LB	LG 41 IN
NSN 4320-01-092-2210	DATE MFD XCX	HGT 32 IN
ENG SER XBX	SHIP WT 560 LB	W 34 IN
WARRANTY	MO MI	CU 26 FT
DATE SHIPPED XCX	DATE INSP	INSP STAMP

BARNES PUMP

MFD BY PEABODY BARNES INC MANSFIELD OHIO USA

70005

OPERATING PROCEDURE

1. CHECK ENGINE OIL LEVEL - IF LOW FILL TO REQUIRED LEVEL WITH OIL TO MIL - L - 2104
2. CHECK GEAR BOX OIL LEVEL - IF LOW FILL TO REQUIRED LEVEL WITH SAE 90.
3. APPLY GREASE TO ZERK FITTING AND CONNECTING ROD BEARING WITH GREASE TO MIL - G - 23827.

(A) TIE DOWN SLINGING PROVISIONS, (MULTI-EYES).

WARNING

Oil has been drained for shipping. Refill prior to starting or warranty will be void.

Figure 4. Data Plates.

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) FIG NO	(b) ITEM NO	SMR CODE	NATIONAL STOCK NUMBER	FSCM	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 04 ACCESSORY ITEMS		
4	1	PAOZZ	5320-01-023-2529	81349	M24243/1-A404	RIVET,BLIND..	EA	4
4	2	PAOZZ		05748	70004	PLATE,ID..	EA	1
4	3	PAOZZ		05748	51454	PLATE,ID..	EA	1
4	4	PAOZZ		05748	70005	PLATE,OPERATING INSTRUCTIONS..................................	EA	1
4	5	PAOZZ		05748	35863	TAG,CAUTION..	EA	1

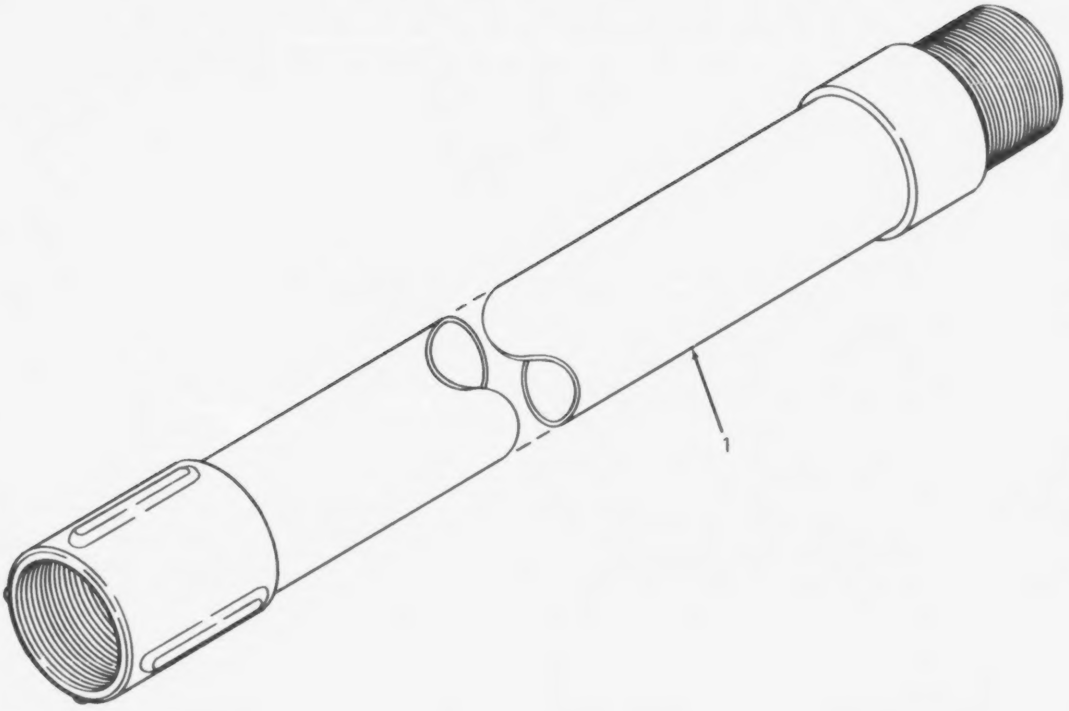

Figure 5. Suction Hose.

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6) DESCRIPTION	(7)	(8) QTY INC
(a) FIG NO.	(b) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	FSCM	PART NUMBER	USABLE ON CODE	U/M	IN UNIT
5	1	PAOZO	4720-00-202-8653	05748	70559	HOSE ASSEMBLY,NONMETALLIC	EA	4
5	2	PAOZZ	4730-00-203-6309	21363	D1345D	STRAINER	EA	1

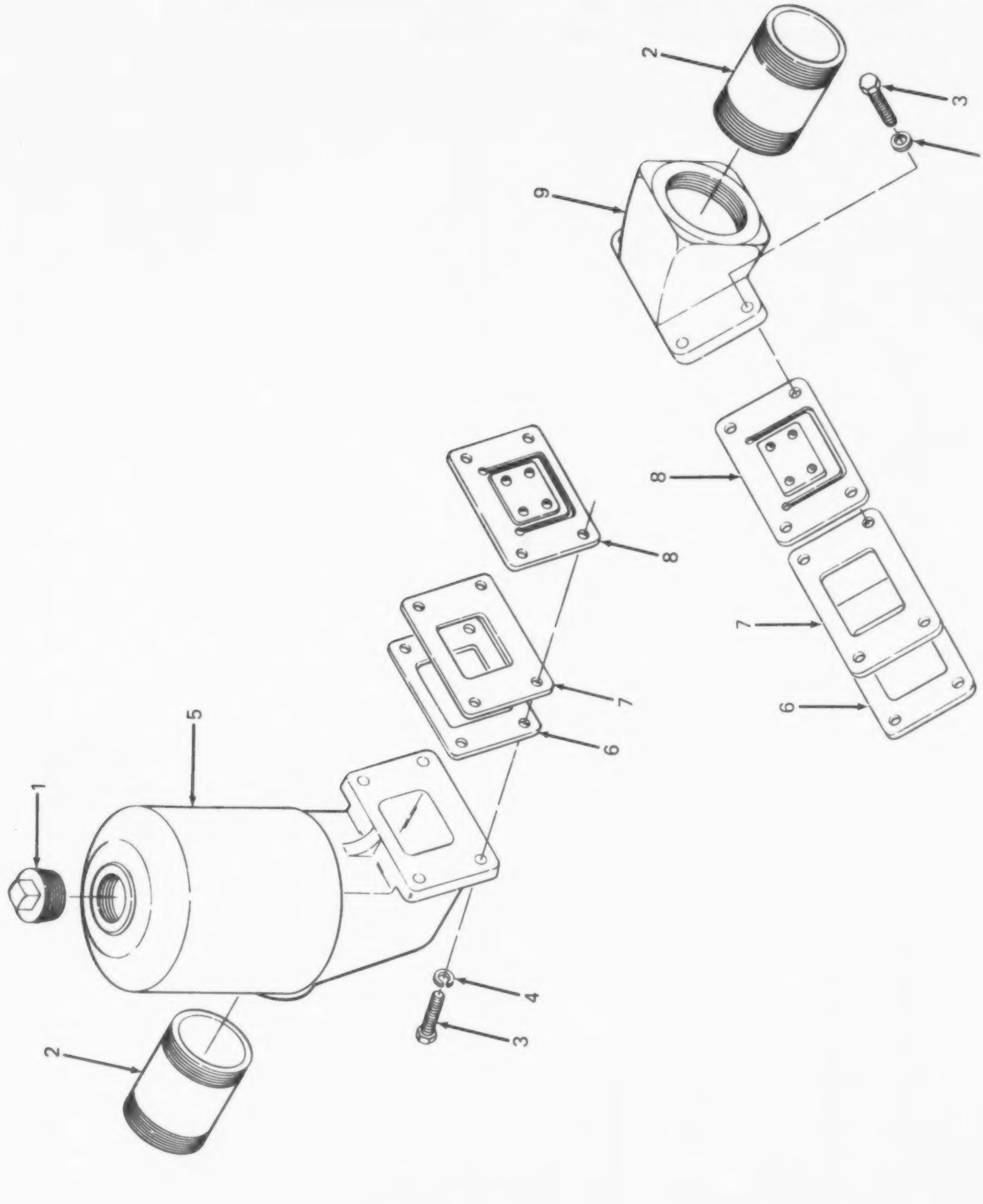
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Figure 6. Accumulator, Check Valve Assemblies, and Discharge Port.

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) FIG NO	(b) ITEM NO	SMR CODE	NATIONAL STOCK NUMBER	FSCM	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
						GROUP 05 PUMP		
6	1	PAOZZ	4730-00-826-6516	96906	MS51884-17ZH	PLUG,PIPE	EA	1
6	2	PAOZZ	4730-00-196-1562	96906	51953-270	NIPPLE,PIPE	EA	2
6	3	PAOZZ	5305-00-042-6417	96906	MS90725-113	SCREW,CAP,HEXAGON HEAD	EA	8
6	4	PAOZZ	5310-00-584-5272	96906	MS35338-48	WASHER,LOCK	EA	8
6	5	XBOFF		05748	70040	ACCUMULATOR	EA	1
6	6	PAOZZ	5330-01-132-2205	05748	70015	GASKET	EA	2
6	7	PAOZZ		05748	70014	PLATE,SEAL	EA	2
6	8	PAOZZ	4820-01-130-1300	05748	70044SA	VALVE,CHECK	EA	2
6	9	XBOFF		05748	70041	PORT DISCHARGE	EA	1

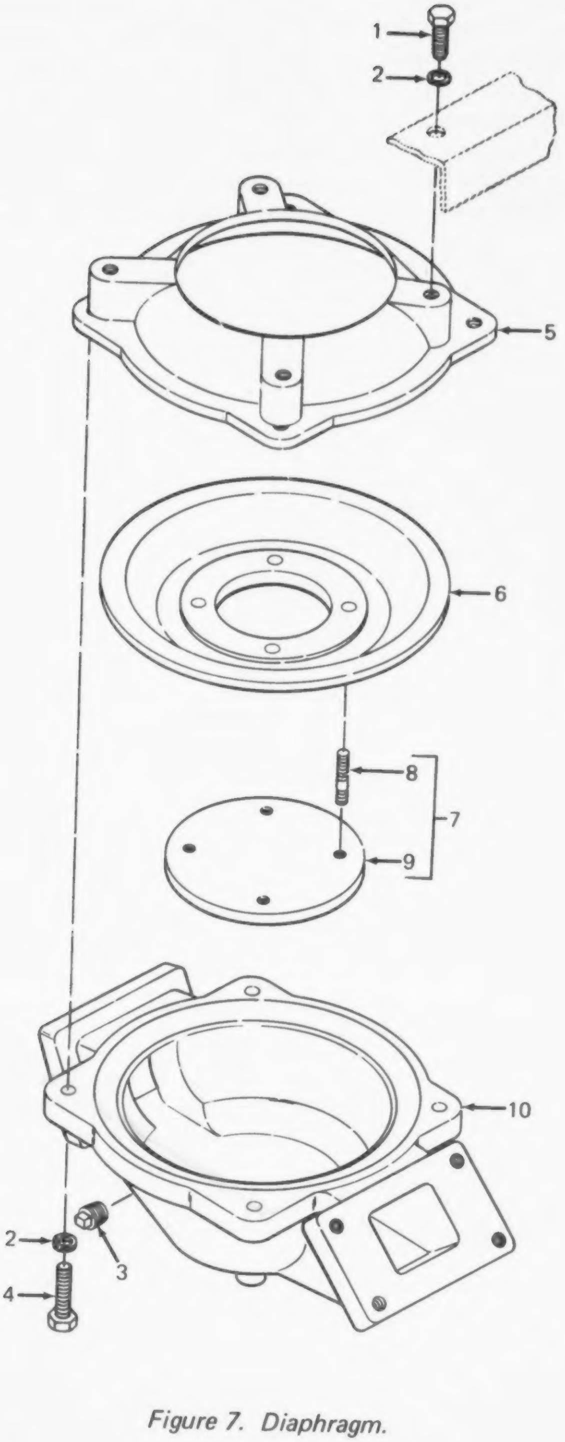
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Figure 7. Diaphragm.

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8)
(a) FIG NO	(b) ITEM NO	SMR CODE	NATIONAL STOCK NUMBER	FSCM	PART NUMBER	DESCRIPTION USABLE ON CODE	U/M	QTY INC IN UNIT
7	1	PAOZZ	5305-00-724-5910	96906	MS90725-162	SCREW,CAP,HEXAGON HEAD	EA	2
7	2	PAOZZ	5310-00-820-6653	80045	23MS35338-50	WASHER,LOCK	EA	6
7	3	PAOZZ	4730-00-044-4587	96906	MS51884-7	PLUG,PIPE	EA	1
7	4	PAOZZ	5305-00-724-5913	96906	MS90725-166	SCREW,CAP,HEXAGON HEAD	EA	4
7	5	XBOFF		05748	70002	CLAMP	EA	1
7	6	PAOZZ		05748	00129	DIAPHRAGM	EA	1
7	7	PBOOZ	4320-01-130-6295	05748	70045SA	CLAMP ASSEMBLY	EA	1
7	8	PAOZZ		05748	70038	.STUD,PLAIN	EA	4
7	9	XAOFF		05748	70017	.CLAMP,CONNECTING ROD	EA	1
7	10	XBOFF		05748	70001	BOWL	EA	1

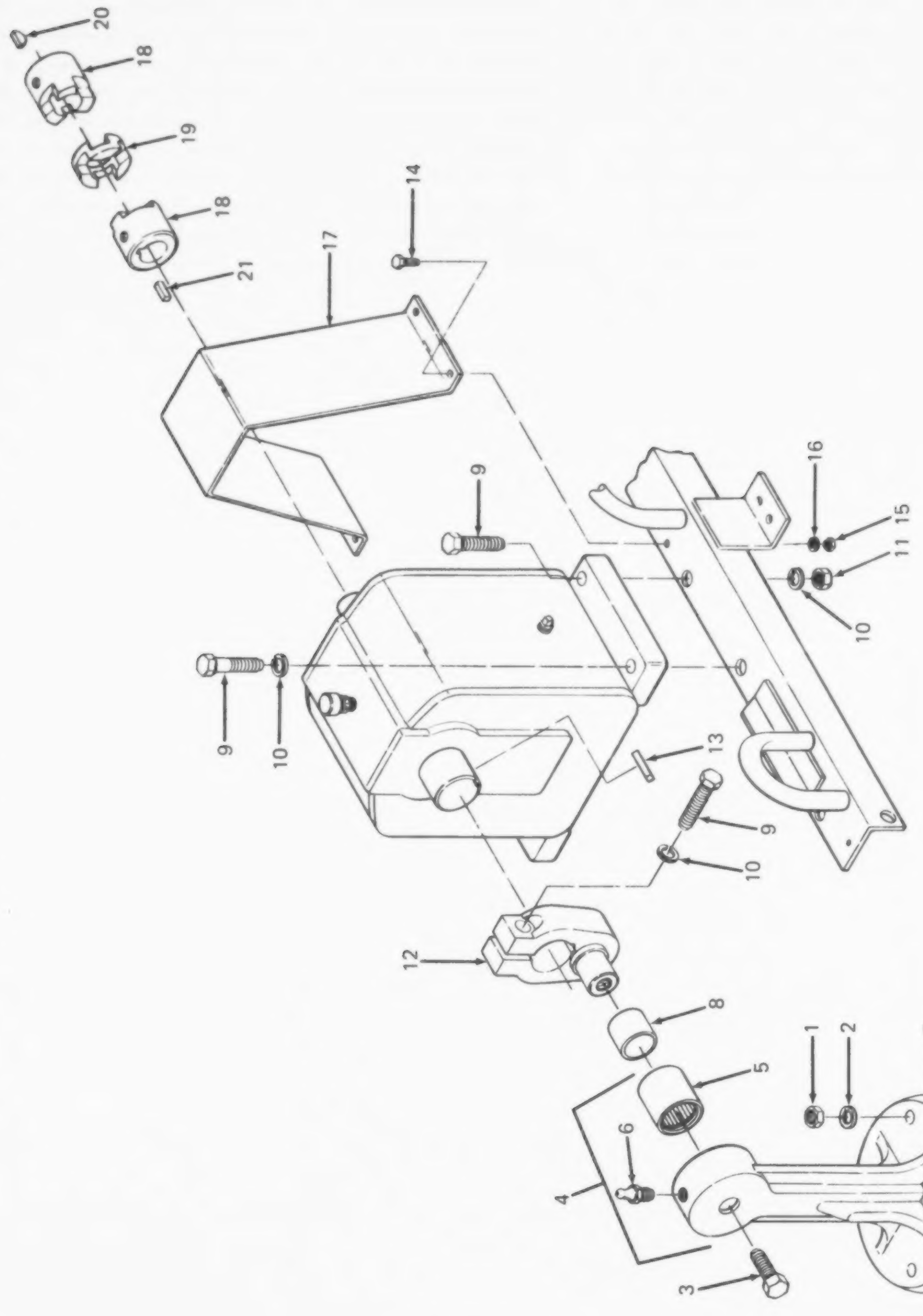
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Figure 8. Connecting Rod Assembly.

(1) ILLUSTRATION (a) FIG NO	(1) ILLUSTRATION (b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
8	1	PAOZZ	5310-00-768-0318	96906	MS51967-14	NUT,PLAIN,HEXAGON	EA	4
8	2	PAOZZ	5310-00-584-5272	96906	MS35338-48	WASHER,LOCK	EA	4
8	3	PAOZZ	5306-01-132-0498	05748	70019	BOLT,CRANK	EA	1
8	4	XBOFF		05748	700435A	ROD ASSEMBLY, CONNECTING	EA	1
8	5	PAOZZ	3110-00-227-3249	96906	MS51961-22	.BEARING,ROLLER,NEEDLE	EA	1
8	6	PAOZZ	4730-00-048-1788	95879	16278	.FITTING,LUBRICATION	EA	1
8	7	XBOZZ		05748	70016	.ROD,CONNECTING	EA	1
8	8	PAOZZ	3110-00-198-1389	96906	MS51962-22	RING,BEARING,INNER	EA	1
8	9	PAOZZ	5305-00-724-5913	96906	MS90725-166	SCREW,CAP,HEXAGON HEAD	EA	5
8	10	PAOZZ	5310-00-820-6653	80045	23MS35338-50	WASHER,LOCK	EA	5
8	11	PAOZZ	5310-00-763-8920	96906	MS51967-20	NUT,PLAIN,HEXAGON	EA	2
8	12	XDOZZ		05748	70018	CRANK	EA	1
8	13	PAOZZ	5315-01-132-3562	05748	37165	KEY,SQUARE	EA	1
8	14	PAOZZ	5305-00-068-0502	96906	MS90725-6	SCREW,CAP,HEXAGON HEAD	EA	4
8	15	PAOZZ	5310-00-761-6882	96906	MS51967-2	NUT,PLAIN,HEXAGON	EA	4
8	16	PAOZZ	5310-00-582-5965	96906	MS35338-44	WASHER,LOCK	EA	4
8	17	XBOZZ		05748	70045	GUARD,COUPLING	EA	1
8	18	PBOZZ	3010-00-517-1848	75665	L100-1-250BORE	COUPLING,SHAFT,FLEX	EA	1
8	19	PAOZZ		75665	LX406	INSERT,FLEX COUPLING	EA	1
8	20	PAOZZ	5315-00-043-1787	96906	MS35756-34	KEY,WOODRUFF	EA	1
8	21	PAOZZ	5315-01-130-7863	05748	39328	KEY,SQUARE	EA	

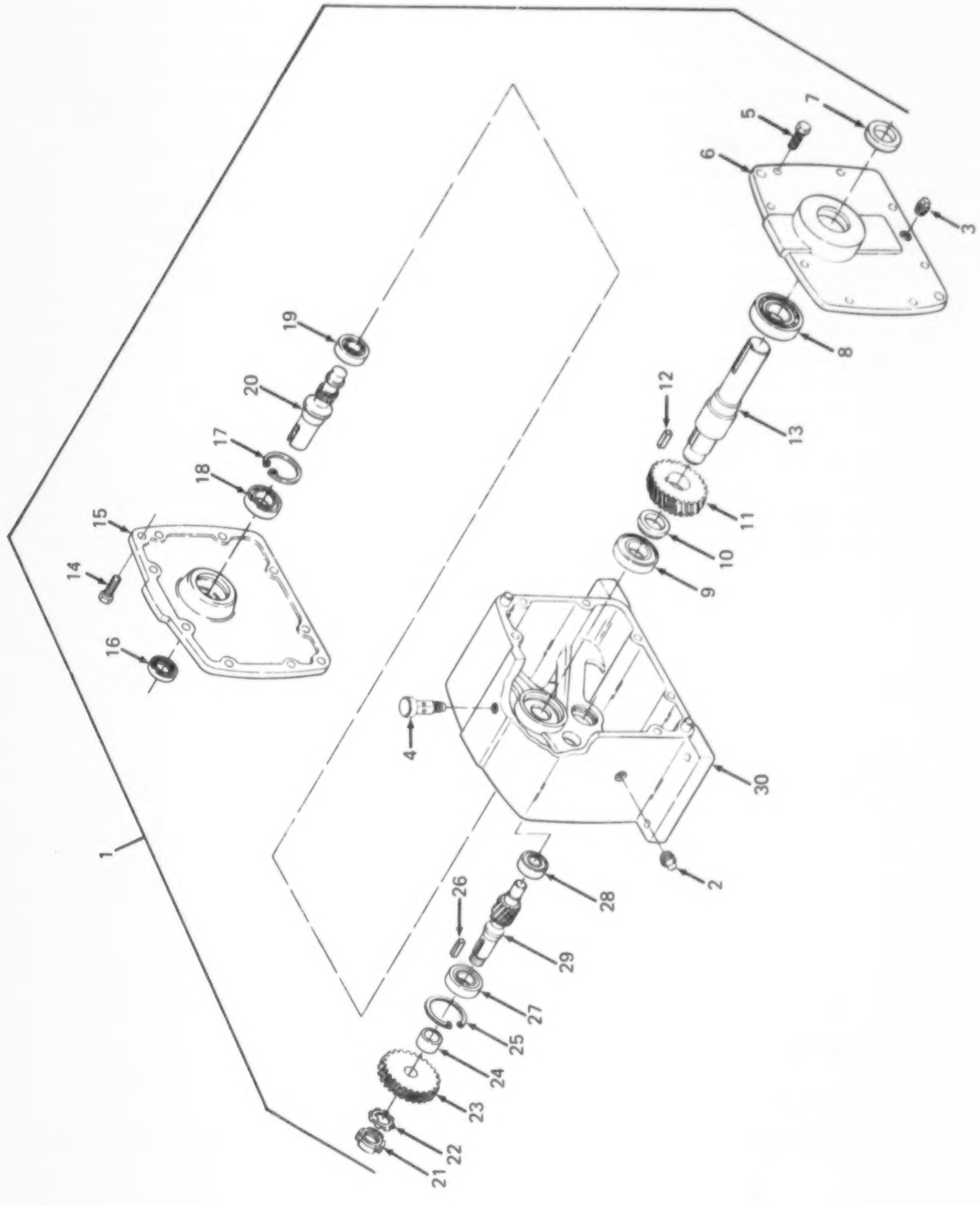
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Figure 9. Gear Reducer

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6) DESCRIPTION	(7)	(8)
(a) FIG NO.	(b) ITEM NO.	SMR CODE	NATIONAL STOCK NUMBER	FSCM	PART NUMBER	USABLE ON CODE	U/M	QTY INC IN UNIT
9	1	PAOFF	3010-01-131-3639	61147	7ND549YU1UA 02N01	REDUCER ASSY,GEAR	EA	1
9	2	XDOZZ		61147	A688003AA013	.PLUG,PIPE,LEVEL	EA	1
9	3	XDOZZ		61147	A688003AA012	.PLUG,PIPE,DRAIN	EA	1
9	4	XDOZZ		61147	A697002AG701	.BREATHER	EA	1
9	5	XDOZZ	5306-01-133-0653	61147	A684001AC310	.BOLT	EA	8
9	6	XDOZZ		61147	B615174AA001	.COVER,OUTPUT	EA	1
9	7	PAFZZ	5330-01-129-9471	61147	A676000AH354	.SEAL,OUTPUT	EA	1
9	8	PAFZZ		61147	A673023AA027	.BEARING,ROLLER	EA	1
9	9	PAFZZ		61147	A673023AA028	.BEARING,ROLLER	EA	1
9	10	XDFZZ	5315-01-133-0654	61147	A670006AA007	.KEY,SQUARE	EA	1
9	11	PBFZZ	3020-01-129-3031	61147	A621009AB001	.GEAR,LOW-SPEED	EA	1
9	12	XDFZZ	5315-01-133-0656	61147	A671001AA006	.KEY	EA	1
9	13	PBFZZ	3040-01-130-1713	61147	B630052AG002	.SHAFT,OUTPUT	EA	1
9	14	XDOZZ		61147	B615190AA001	.COVER,INPUT	EA	1
9	15	PAFZZ	5330-01-129-9472	61147	A676000AE207	.SEAL,INPUT	EA	1
9	16	PAFZZ	5365-01-132-0815	61147	A685001AB137	.RING,SNAP	EA	1
9	17	PAFZZ		61147	A673003AA207	.BEARING,ROLLER	EA	1
9	18	PAFZZ		61147	A673002AA303	.BEARING,ROLLER	EA	1
9	19	PBFZZ	3040-01-130-2124	61147	B632042AG001	.SHAFT,INPUT	EA	1
9	20	PAFZZ	5310-01-130-1149	61147	A684016AA106	.LOCKNUT	EA	1
9	21	PAFZZ	5310-01-133-0961	61147	A685011AA106	.WASHER,LOCK	EA	1
9	22	PBFZZ	3020-01-131-3640	61147	A620009AS	.GEAR,HIGH-SPEED	EA	1
9	23	PAFZZ	5365-01-130-1196	61147	A660003A0019	.SPACER,SLEEVE	EA	1
9	24	PAFZZ	5365-01-132-1928	61147	A685000AB283	.RING,SNAP	EA	1
9	25	XDFZZ		61147	A670003AA010	.KEY,SQUARE	EA	1
9	26	PAFZZ		61147	A673003AA207	.BEARING,ROLLER	EA	1
9	27	PAFZZ		61147	A673024A0017	.BEARING,ROLLER	EA	1
9	28	PBFZZ	4320-01-130-4071	61147	B694010AB701	.JACKSHAFT	EA	1
9	29	XDFZZ		61147	C600054AA001	.HOUSING,GEAR	EA	1

(1) ILLUSTRATION (a) FIG NO	(b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	(6) DESCRIPTION USABLE ON CODE	(7) U/M	(8) QTY INC IN UNIT
9	27	PAFZZ		50706	7MU549YU1UA01N01 -127	.BEARING,ROLLER..	EA	1
9	28	PAFZZ		50706	7MU549YU1UA01N01 -128	.BEARING,ROLLER..	EA	1
9	29	PBFZZ	4320-01-130-4071	50706	7MU549YU1UA01N01 -230	.JACK,SHAFT INSTALL NEW LOW-SPEED GEAR -235 WHEN NEW JACKSHAFT IS INSTALLED..	EA	1
9	30	XAFZZ		50706	7MU549YU1UA01N01 -001	.HOUSING,GEAR...	EA	1

SECTION IV. NATIONAL STOCK NUMBER AND PART NUMBER INDEX

STOCK NUMBER	FIGURE NO.	ITEM NO.
5305-00-042-6417	6	3
5315-00-043-1787	8	20
4730-00-044-4587	7	3
5310-00-045-3296	2	2
4730-00-048-1788	8	6
5305-00-052-9050	3	21
5305-00-068-0502	1	1
5305-00-068-0502	8	14
5305-00-068-1802	2	3
4730-00-163-4680	2	9
4730-00-196-1562	6	2
3110-00-198-1389	8	8
4720-00-202-8653	5	1
4730-00-203-6309	5	2
3110-00-227-3249	8	5
5305-00-269-3211	3	4
3010-00-517-1848	8	18
5310-00-543-2500	3	9
5310-00-582-5965	1	2
5310-00-582-5965	3	15
5310-00-582-5965	8	16
5310-00-584-5272	6	4
5310-00-584-5272	8	2
2910-00-605-1353	2	8
5310-00-637-9541	3	6
2910-00-697-1384	2	6
2910-00-707-7502	2	4
5305-00-724-5910	7	1
5305-00-724-5913	7	4
5305-00-724-5913	8	9
5310-00-732-0558	3	5
5310-00-761-6882	3	14
5310-00-761-6882	8	15
5310-00-763-8920	8	11
5310-00-768-0318	8	1
4730-00-810-0059	2	13
5310-00-820-6653	7	2
5310-00-820-6653	8	10

STOCK NUMBER	FIGURE NO.	ITEM NO.
4730-00-826-6516	6	1
5315-00-849-9854	3	8
4720-00-904-6608	2	14
2910-00-905-9792	2	15
2990-00-972-7950	1	4
5310-01-012-7400	2	1
5320-01-023-2529	4	1
3920-01-128-4664	3	1
3020-01-129-3031	9	11
5330-01-129-9471	9	7
5330-01-129-9472	9	15
5310-01-130-1149	9	20
5365-01-130-1196	9	23
4320-01-130-1285	3	17
4820-01-130-1300	6	8
3040-01-130-1713	9	13
3040-01-130-2124	9	19
4320-01-130-4071	9	28
4320-01-130-6295	7	7
5315-01-130-7863	8	21
3010-01-131-3639	9	1
3020-01-131-3640	9	22
5306-01-132-0498	8	3
5306-01-132-0503	3	16
5365-01-132-0815	9	16
5365-01-132-1928	9	24
5330-01-132-2205	6	6
5315-01-132-3562	8	13
4320-01-132-4909	3	3
5306-01-132-5599	3	2
2530-01-132-7493	3	10
5305-01-133-0653	9	5
5315-01-133-0654	9	10
5315-01-133-0656	9	12
5310-01-133-0961	9	21
2805-01-169-1100	1	3

FSCM	PART NUMBER	FIGURE NO.	ITEM NO.
61147	A620009AS	9	22
61147	A621009AB001	9	11
61147	A660003A0019	9	23
61147	A670003AA010	9	25
61147	A670006AA007	9	10
61147	A671001AA006	9	12
61147	A673002AA303	9	18
61147	A673003AA207	9	17
61147	A673003AA207	9	26
61147	A673023AA027	9	8
61147	A673023AA028	9	9
61147	A673024A0017	9	27
61147	A676000AE207	9	15
61147	A676000AH354	9	7
61147	A684001AC310	9	5
61147	A684016AA106	9	20
61147	A685000AB283	9	24
61147	A685001AB137	9	16
61147	A685011AA106	9	21
61147	A688003AA012	9	3
61147	A688003AA013	9	2
61147	A697002AG701	9	4
61147	B615174AA001	9	6
61147	B615190AA001	9	14
61147	B630052AG002	9	13
61147	B632042AG001	9	19
61147	B694010AB701	9	28
61147	C600054AA001	9	29
75665	L100-1-250BORE	8	18
96906	MS15795-826	3	9
96906	MS24630-35	3	21
96906	MS24665-498	3	8
96906	MS35218-59	2	3
96906	MS35338-43	2	2
96906	MS35338-44	1	2
96906	MS35338-41	3	15
96906	MS35338-41	8	16
96906	MS35338-46	3	6
6906	MS35338-48	6	4
6906	MS35338-48	8	2
6906	MS35756-34	8	20
6906	MS51086-1	2	15
6906	MS51884-17ZH	6	1
6906	MS51884-7	7	3

FSCM	PART NUMBER	FIGURE NO.	ITEM NO.
96906	MS51961-22	8	5
96906	MS51962-22	8	8
96906	MS51967-14	8	1
96906	MS51967-2	3	14
96906	MS51967-2	8	15
96906	MS51967-20	8	11
96906	MS51967-8	3	5
96906	MS90725-113	6	3
96906	MS90725-162	7	1
96906	MS90725-166	7	4
96906	MS90725-166	8	9
96906	MS90725-6	1	1
96906	MS90725-6	8	14
96906	MS90725-60	3	4
81349	MS24243/1-A404	4	1
05748	00129	7	6
05748	03200	2	9
75665	1X406	8	19
97403	13200E8821	2	4
97403	13200E8823	2	10
05748	15361	2	1
95879	1627B	8	6
05748	18310SA	2	11
05748	18326	2	5
05748	18327	2	6
05748	18328	2	7
29510	193421H1	2	8
97403	2A016-4	1	3
80045	23MS35338-50	7	2
80045	23MS35338-50	8	10
05748	24959	2	14
05748	35481SA	2	12
05748	35564	2	13
05748	35863	4	5
05748	37165	8	13
05748	38737	3	20
05748	39328	8	21
05748	51454	4	3
	51953-270	6	2
11431	5234	3	13
11431	52349551	3	10
05748	62272	3	16
61147	7ND549YU1UA02N01	9	1

NATIONAL STOCK NUMBER AND PART NUMBER INDEX

SECTION IV

FSCM	PART NUMBER	FIGURE NO.	ITEM NO.
05748	70001	7	10
05748	70002	7	5
05748	70004	4	2
05748	70005	4	4
05748	70014	6	7
05748	70015	6	6
05748	70016	8	7
05748	70017	7	9
05748	70018	8	12
05748	70019	8	3
05748	70020	3	7
05748	70027SA	3	18
05748	70038	7	8
05748	70039	3	17
05748	70040	6	5
05748	70041	6	9
05748	70043SA	8	4
05748	70044SA	6	8
05748	70045SA	7	7
05748	70047	3	1
05748	70048	3	19
05748	70049	8	17
05748	70050	3	3
05748	70554	3	2
05748	70559	5	1
11431	9474	3	12
11431	9551	3	11
97403	9786E121	1	4

APPENDIX D
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the US40CDG Pump. These items are authorized to you by CTA 50-970, Expendable items (Except Medical, Class V, Repair Parts, and Heraldic Items).

D-2. EXPLANATION OF COLUMNS

a. *Column 1 – Item number.* This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, App. D").

b. *Column 2 – Level.* This column identifies the lowest level of maintenance that requires the listed item.

O – Organizational Maintenance
F – Direct Support Maintenance

c *Column 3 – National Stock Number.* This is the National stock number assigned to the item; use it to request or requisition the item.

d. *Column 4 – Description.* Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parentheses, if applicable.

e. *Column 5 – Unit of Measure (U/M).* Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	O		LUBRICATING OIL, INTERNAL COMBUSTION ENGINE, HEAVY DUTY, MIL-L-2104, GRADE 10 OR GRADE 30	
2	O, F		DRY CLEANING SOLVENT, P-D-680	
3	O		GREASE, INSTRUMENT, AIRCRAFT, MIL-G-23827	
4	O		GREASE, AUTOMOTIVE AND ARTILLERY, MIL-G-10924	
5	O, F		LUBRICATING OIL, GEAR, MULTI-PURPOSE, MIL-M-2105, GRADE 90	
6	O, F		GREASE, BALL AND ROLLER BEARING, MIL-G-18709	
7	O, F		LOCTITE NO. 242 (05972)	
8	F		SEALER, SILMATE NO. A689005AA-006 (02787)	

GLOSSARY

Section I. ABBREVIATIONS

amps	Ampere
°C	Degree Celsius
CBR	Chemical-biological-radiological
EIR	Equipment Improvement Recommendations
°F	Degree Fahrenheit
ft lb	Foot pound
gpm	Gallons per minute
kg	Kilogram
kPa	Kilopascal
lb	Pound
mm	Millimeter
MTOE	Modified table of organization and equipment
N·m	Newton·meter
NPT	National pipe thread
phr	Pounds per hour
PMCS	Preventive maintenance checks and services
psi	Pounds per square inch
rpm	Revolutions per minute
TMDE	Test, measurement, and diagnostic equipment
vdc	Volts direct current

Section II. DEFINITION OF UNUSUAL TERMS

A

ABRASION – A scraped or scuffed area. A hose may become abraded if an unshielded portion of it rubs against a piece of bracket or another hose.

ALIGN – To arrange in a line vertically and/or horizontally. In order to bolt check valve assembly to pump bowl, bolt holes must be aligned.

ALLOCATION – Assignment of duties or materiels according to a plan.

ALPHA-NUMERIC – In alphabetical and numerical order. An alpha-numeric die set includes one die for each letter in the alphabet, and one die for each number zero through nine.

APPENDIX – A collection of supplementary material at the end of a book.

APPROVED – Permitted to be used for a specific purpose by the person or group who is allowed to grant approval.

ASSEMBLY – A combination of parts that may be taken apart without destruction, which has no application or use of its own but is needed for the completeness of a more complex item with which it is combined, or to which it is attached.

B

BAIL – An arched, hooplike handle, as of a pail.

BRINELLED – A deformation of a bearing by an impact.

C

CAPACITY – The volume, amount, or quantity that can be held or contained. The fluid capacity of the hydraulic system is 2.5 gallons, which means that it holds that much fluid when it is filled to the proper level.

CARBON MONOXIDE – A poisonous gas that is made while a fuel is burning, especially if there is not quite enough air. The gas is colorless, odorless, and tasteless, but it can cause illness or death. See the warnings on the Warning page at front of manual.

COMBUSTION – A chemical change, especially oxidation, accompanied by the production of heat and light. A combustion engine functions by burning a fuel to produce heat, i.e., energy.

COMPONENT – A part or a combination of parts which together accomplish a function.

COMPRESSED AIR – Air that is under pressure. When the compressed air in a hose or pipe is allowed to escape (such as when you use an air gun), the air moves very fast and is used to blow away dirt and chips for cleaning.

CONDENSATION – A liquid formed from a vapor. Moisture carried in warm air will condense when it reaches a cold area, such as the surface of a fuel tank in sub-zero weather.

CONTAMINATED – Made impure by contact or mixture. Exhaust fumes contain a poisonous gas which will contaminate the air in the nearby area.

CORROSION – A gradual wearing away caused by chemical action. Metals exposed to salt water are likely to corrode.

COUPLING – A device which connects a power source to a reducer and/or to a load; it will compensate for some misalignment and usually prevents metal to metal contact.

D

DEBRIS – The scattered remains of something broken or destroyed.

DEFICIENCY – An incompleteness; lacking an essential element.

DETERIORATE – A worsening of condition usually as a result of age or hostile environment, as opposed to mechanical damage.

DIAPHRAGM – An elastic material used as a boundary to seal and separate two areas. A pump diaphragm allows the volume of the pump bowl to be varied thus producing the pumping action.

DIMINISH – To make or become smaller or less important.

DISTORTION – The bending, twisting, or any other dynamic change of a surface.

DRAW BAR – A single piece handle used for lifting heavy objects.

DRY ROT – Rotting due to lack of air circulating around area.

E

EXHAUST – The gases that leave the vehicle engine through the tailpipe while the engine is running.

EXPENDABLE – An item that is not repairable and is discarded if damaged.

EXPOSURE – Being in the presence of something, or in contact with something. Skin is exposed to cleaning solvent when the solvent contacts the skin during cleaning operations.

F

FILTER – A device which removes dirt from the air or a fluid.

FLASH POINT – The lowest temperature at which the vapors of a solvent will ignite and burn.

FLAPPER – A restriction in a line which limits the flow of fluid, or gases, to a single direction. Flappers used in conjunction with a diaphragm pump and a power source enable the pump to push/pull fluid in desired direction

FLUID – A substance which can flow; that is, either a gas or a liquid. The fluid used in the engine is gasoline.

G

GALLING – A condition in which transfer of metal occurs between two parts made of like material (usually steel), usually occurring when mated parts have limited relative motion under high loads.

GASKET – A seal or packing used between matched machine parts or around pipe joints to prevent the escape of gas or fluid.

GOGGLES – A device used to protect the eyes from dust, dirt, flying chips, etc.

H

HAZARD – A danger or risk.

I

IMMERSE – To completely cover by fluid.

INHALATION – The act of breathing in. The breathing in or inhalation of carbon monoxide can cause illness or death. Refer to the Warning page at front of manual.

INITIAL – The first or starting condition.

INNER RACE – A component of a bearing assembly upon which the needles or rollers ride; used to insure full contact and uniform surface condition.

K

KEYWAY – A channel machined in a shaft into which a length of hardened steel stock, usually rectangular in cross section, is inserted to prevent the relative motion of a mating part.

L

LEGIBLE – Capable of being read. A legible nameplate can be read; an illegible plate can not.

LUBRICANT – A material such as grease, or machine oil, that reduces friction, and preserves, when used as a coating on moving parts.

M

MALFUNCTION – Occurs when a unit fails to operate normally.

MANUFACTURER – The company which makes an item or piece of equipment for sale.

MATERIEL – Equipment, apparatus, and supplies of an organization such as an army.

O

OBSTACLE – Something that stands in the way of, or blocks progress toward, a goal.

OBSTRUCTION – An obstacle.

OPERATIONAL – Available for use in accordance with the applicable specification.

OUTPUT – The energy, power, or work produced by a system.

P

PIVOT – A short rod or shaft about which a related part rotates; the act of turning on or as if on a pivot.

PORT – A threaded hole through which fluid may pass, or pressure may be measured. Ports on the pump are used to connect hoses, and to measure pressure.

POTENTIALLY – Something which could possibly happen. Cleaning solvents are potentially dangerous, because fire or illness can result if safety instructions are not followed.

PRECAUTION – An action taken in advance to protect against possible failure or danger.

PRELIMINARY – Prior to the main action or business.

PRIME – The act of introducing a liquid into a pump to increase the pump's ability to overcome negative head pressure.

PROLONGED – A condition or situation which exists for an extended period of time.

PROTRUDING – Pushing or jutting outward; projecting.

PROVISIONS – Stipulations or qualifications. Also that which is provided; stock of necessary supplies.

R

RADIOLOGICAL – Using ionizing radiation, or radioactive waves or particles. Radiological protection shields the person or object from damage or injury due to harmful radiation.

RANGE – The minimum and maximum performance levels of any unit and including all measurable points between them.

RECIPROCATING – Equipment that acts along a straight line in alternating direction, i.e., the up and down motion of the connecting rod.

RECOMMENDATIONS – Suggestions for change; advise given usually to make an improvement.

REQUIRE – To demand or need.

RESERVOIR – A container for holding a fluid, such as oil or water, in readiness for use.

RESPIRATION – The process of breathing; inhaling and exhaling.

RESTRICTED – Limited, confined; prevented from moving. Also the reduction of cross-sectional area through which a gas or liquid must flow.

S

SCOPE – The extent of an activity or concept; the amount of information covered as in a book.

SHAFT – A round rod or bar which rotates to transfer rotary motion or torque.

SHOCK – An extreme stimulation of the nerves and muscles caused by the passage of electric current through the body. Also damage caused to mechanical equipment as a result of sudden stoppage of motion.

SLINGING – Using a looped or hanging strap to raise and lower a heavy object, or for carrying or supporting something.

SOLVENT – A liquid that can dissolve another substance.

STREET ELBOW – A pipe fitting which changes direction of flow 90 degrees.

STUD – A type of fastener, or alignment device, which has one end attached to a surface and the other end protruding from that surface. The protruding portion of the stud may be used as an alignment aid or, if threaded, as a fastener.

SYMPTOM – The external sign or indication of a condition.

T

TIEDOWN – Strap or fastening device used to hold an object in position.

TORQUE – Force around an axis. It produces a rotary or twisting motion, and is measured in foot pounds (ft lb) or newton-meters (N·m).

V

VALVE – A device used to control the flow of a fluid.

VAPOR – The gaseous form of any substance which is usually a liquid; vapors are present in the air around the substance.

VENTILATE – To provide with a source of fresh or uncontaminated air.

VISUAL – Visible; detected by the unaided eye.

W

WARPAGE – The twisting, bending, or other distortion of an object which alters its shape.

ALPHABETICAL INDEX

Subject, Para

A

Accumulator
  Repair, 5-9
  Maintenance, 4-19
Adjustments
  Initial, 2-4
  Preliminary, 4-5a
Administrative Storage, 4-28
Assembly and Preparation for Use, 2-3

C

Capabilities, 1-8
Characteristics, 1-7
Checks and Services, Preventive Maintenance (Organizational), 4-7
Checks, Operational
  Operator/Crew, 3-3
  Organizational, 4-6
Clamp Assembly Maintenance, 4-22
Cleaning, 3-5
Common Tools and Equipment
  Direct Support, 5-1
  Organizational, 4-1
Connecting Rod Assembly Maintenance, 4-24
Connecting Rod Repair, 5-10
Coupling Maintenance, 4-25
Crank Repair, 5-10

D

Data, Equipment, 1-11
Data Plates Maintenance, 4-18
Description of External Components, 1-9
Desctruction of Army Materiel to Prevent Enemy Use, 1-3
Diaphragm Maintenance, 4-21
Diaphragm Pump, 1-12
Discharge Port
  Maintenance, 4-20
  Repair, 5-9
Dusty Areas, Operation in, 2-13

E

Enemy Use, Destruction to Prevent, 1-3
Engine Maintenance, 4-12
Equipment
  Common, Direct Support, 5-1
  Common, Organizational Maintenance, 4-1
  Data, 1-11

Subject, Para

  Improvement Recommendations, 1-5
  Preliminary Servicing and Adjustment of, 4-5
  Special, Direct Support, 5-2
  Special, Organizational Maintenance, 4-2
External Components, Location and Description of, 1-9
Extreme Cold, Operation in, 2-10
Extreme Heat, Operation in, 2-11

F

Features, 1-8
Frame Assembly
  Maintenance, 4-16
Repair, 5-7
Fuel Filter Maintenance, 4-13
Fuel Line Maintenance, 4-15
Fuel System, Servicing, 3-4
Fuel Tank Maintenance, 4-14

G

Gear Reducer
  Maintenance, 4-26
  Repair, 5-11

H

High Altitudes, Operation in, 2-12
Humid Conditions, Operation Under, 2-14

I

Identification Plate, 1-10
Initial Adjustments, 2-4
Inspection, Pump Assembly, 4-11

L

Location of External Components, 1-9
Lubrication, 3-1, 4-5b

M

Maintenance Forms, Records, and Reports, 1-2
Maintenance Procedures
  Accumulator, 4-19
  Clamp Assembly, 4-22
  Connecting Rod Assembly, 4-24
  Coupling, 4-25
  Data Plates, 4-18

Subject, Para

  Diaphragm, 4-21
  Direct Support, 5-6
  Discharge Port, 4-20
  Engine, 4-12
  Frame Assembly, 4-16
  Fuel Line, 4-15
  Fuel Filter, 4-13
  Fuel Tank, 4-14
  Gear Reducer, 4-26
  Operator/Crew, 3-2
  Organizational, 4-10
  Pump Assembly Inspection, 4-11
  Pump Bowl, 4-23
  Wheel Assembly, 4-17
Movement to a New Worksite, 2-9

O

Operating Procedure, 2-5
Operating Procedure Plate, 1-10
Operation
  In Extreme Cold, 2-10
  In Extreme Heat, 2-11
  In High Altitudes, 2-12
  In Salt Water Areas, 2-15
  In Sandy or Dusty Areas, 2-13
  Under Rainy or Humid Conditions, 2-14
  Under Usual Conditions, 2-7
Operational Checks
  Operator/Crew, 3-3
  Organizational, 4-6

P

Packing and Shipping, 4-29
Preliminary Servicing of Equipment, 4-5a
Preparation for Storage and Shipment, 4-27
Preparation for Use, 2-3
Preventive Maintenance Checks and Services
  Operator/Crew, 2-2
  Organizational, 4-7
Principles of Operation, 1-12
Procedure, Operating, 2-5
Pump
  Bowl Maintenance, 4-23
  Capabilities and Features, 1-8
  Characteristics, 1-7
  Inspection, 1-11
  Principles of Operation, 1-12
  Purpose of, 1-6
  Repair, 5-8

R

Rainy Conditions, Operation Under, 2-14
Reducer, Gear
  Maintenance, 4-26
  Repair, 5-11

Subject, Para

Repair
  Accumulator, 5-9
  Connecting Rod, 5-10
  Crank, 5-10
  Discharge Port, 5-9
  Frame Assembly, 5-7
  Gear Reducer, 5-11
  Pump, 5-8
Repair Parts
  Direct Support, 5-3
  Organizational, 4-3
Reporting Equipment Improvement Recommendations (EIR), 1-5

S

Salt Water Areas, Operation in, 2-15
Sandy Areas, Operation in, 2-13
Scope, 1-1
Service Upon Receipt of Materiel, 4-4
Servicing Fuel System, 3-4
Shipment, Preparation for, 4-29
Spares
  Direct Support, 5-3
  Organizational, 4-3
Special Tools
  Direct Support, 5-2
  Organizational, 4-2
Starting, 2-6
Stopping, 2-8
Storage
  Preparation for, 4-27
  Administrative, 4-28
Support Equipment
  Direct Support, 5-2
  Organizational, 4-2
Symptom Index
  Direct Support, 5-5
  Organizational Maintenance, 4-9

T

Tools
  Common, Direct Support, 5-1
  Common, Organizational Maintenance, 4-1
  Special, Direct Support, 5-2
  Special, Organizational Maintenance, 4-2
Troubleshooting
  Direct Support, 5-4
  Operator/Crew, 3-1
  Organizational Maintenance, 4-8

W

Wheel Assembly Maintenance, 4-17
Worksite, Movement to, 2-9

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

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FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 5-4320-275-13&P	1 Mar 83	Pump, Reciprocating, Power-Driven, Diaphragm, GED

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
6	2-1 a			In line 6 of paragraph 2-1a the manual states the engine has 6 Cylinders. The engine on my set only has 4 Cylinders. Change the manual to show 4 Cylinders.
81		4-3		Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the Other.
125	line	20		I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got What I ordered, so the NSN is Wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

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The Metric System and Equivalents

Linear Measure

1 centimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.365	metric tons	short tons	1.102
pound-inches	mewton-meters	.11375			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C